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ABSTRACT

Does Longer Compulsory Education Equalize Schooling by Gender and Rural/Urban Residence?*

This study examines the effects of the extension of compulsory schooling from 5 to 8 years in Turkey in 1997 – which involved substantial investment in school infrastructure – on schooling outcomes and, in particular, on the equality of these outcomes between men and women, and urban and rural residents using the Turkish Demographic and Health Surveys. This policy is peculiar because it also changes the sheepskin effects (signaling effects) of schooling, through its redefinition of the schooling tiers. The policy is also interesting due to its large spillover effects on post-compulsory schooling as well as its remarkable overall effect; for instance, we find that the completed years of schooling by age 17 increases by 1.5 years for rural women. The policy equalizes the educational attainment of urban and rural children substantially. The urban-rural gap in the completed years of schooling at age 17 falls by 0.5 years for men and by 0.7 to 0.8 years for women. However, there is no evidence of a narrowing gender gap with the policy. On the contrary, the gender gap in urban areas in post-compulsory schooling widens. The findings suggest that stronger sheepskin effects for men, resulting from their much higher labor-force participation rate, bring about this widening gender gap.

JEL Classification: I21, I24, I28, J15, J16

Keywords: compulsory schooling, gender, rural and urban, equality in education, regression discontinuity design

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1 Introduction

Educational attainment remains at dismally low levels in several developing countries. The fraction of children who persist to grade 5 was below 40 percent in Chad and Madagascar, below 50 percent in Angola, Ethiopia, and Rwanda in 2009 (World Bank, 2013). In addition, great disparities in schooling by gender and place of residence still exist in many parts of the world. Despite the progress made towards equality in schooling, women continue to lag behind men in many developing countries.[1] For instance, the gender schooling gap in primary schools exceeds 10 percentage points in Yemen, Niger, Cote d'Ivoire, Mali, and Pakistan. Rural–urban divide in schooling is another stylized fact in many parts of the developing world. Orazem and King (2008) report that urban–rural gaps around the world are even larger than the gender gaps. Gender and urban–rural disparities in schooling outcomes in Turkey—the context of this study—are also quite significant.[2]

Many developing countries have implemented policies to improve schooling outcomes and to eliminate the disparities in schooling attainment across various subgroups. Demand-side policies such as conditional cash transfer programs (CCTs), voucher programs, and food-for-education programs that aim to increase households' demand for children's schooling have been studied extensively in the literature.[3] Supply-side policies aim to reduce the cost of schooling by increasing school accessibility. School construction programs and free school provision are among the most commonly used supply-side interventions.[4] Although compulsory schooling policies—another supply-side policy—have been widely studied in developed

[1] Orazem and King (2008) as well as Grant and Behrman (2010) report significant improvement over time in the schooling attainment of women relative to that of men.

[2] According to the 1998 wave of the Turkish Demographic and Health Survey, among 11- to 15-year-old boys, while 79.4 percent of urban residents were enrolled in school, this figure was 67.1 percent among rural residents. The urban–rural gap was much wider among girls of the same age: 38.3 percent of rural residents were enrolled in school compared to 64.5 percent of urban residents.

[3] Studies on demand-side policies are discussed in Skoufias (2001) and Behrman et al. (2005). Ito (2006) and Behrman (2010) review studies on both demand- and supply-side policies.

[4] Herz and Sperling (2004) provide evidence from a large number of countries that reducing the cost of schooling—by way of cutting school fees and building schools closer to homes—disproportionately improves the schooling of girls. Free universal schooling implemented in many parts of Africa is generally found to more favorably affect the schooling of girls than of boys. For instance, Deininger (2003) finds an overall increase in primary school enrollment following the implementation of free schooling in Uganda, with marked reduction in gender disparities. Osili and Long (2008), studying the Nigerian tuition-free primary education program, find significant gains (1.5 additional years of schooling) for women. However, Lucas and Mbiti (2012), examining the primary school completion rates in Kenya, find that the free primary education program, in fact, widens the gender schooling gap.

country contexts, not much is known about their effects in developing countries. In this paper, we investigate how the extension of compulsory schooling from 5 to 8 years in Turkey in 1997 affects schooling attainment by gender and urban/rural residence and whether this schooling reform narrows or further exacerbates the existing differences across these groups.

The compulsory schooling reform in Turkey is different from those implemented in several developed countries in that it involves a substantial investment in schooling infrastructure to ensure universal accessibility in the newly compulsory grade levels, which is certainly a requirement of any compulsory schooling policy. In this sense, it is similar to the school construction policies in some developing countries previously examined in the literature (Duflo, 2001; Handa, 2002), although the Turkish policy also involves costs of non-compliance.[5] Effects of compulsory schooling policies on schooling outcomes are rarely studied in developing countries. An exception is Taiwan's 1968 education reform, which increased tuition-free compulsory schooling from 6 to 9 years. Spohr (2003) finds the initial effect of the reform to be smaller for girls than for boys, while in a later study, Tsai et al. (2009) find a reduction in the gender schooling gap due to the policy. Although there is a much wider literature on the effects of compulsory schooling on education in developed countries, this literature does not investigate whether there is a differential policy effect across various subpopulations presumably because, unlike it is in Turkey, compliance with the policy is generally very high and there are no strong policy spillover effects on the post-compulsory schooling years in these countries.[6]

Numerous studies around the world show that compulsory schooling has beneficial causal effects on several labor market and demographic outcomes.[7] Although most of these studies

[5] Duflo (2001) finds that the school construction program in Indonesia increases school enrollment among 7- to 12-year-olds from 69 to 83 percent and the average years of schooling by 0.12–0.19 years. The program effect is particularly favorable in sparsely populated regions. Handa (2002), examining the school construction effort in rural Mozambique, finds that while having a school in the village increases the probability of both boys' and girls' primary school enrollment by 20 percentage points, the number of schools in administrative posts—units encompassing villages—affect boys' school enrollment but not girls'.

[6] These studies find that the enactment of compulsory schooling or of its extension results in higher schooling attainment (see, e.g., Angrist and Krueger [1991], Acemoğlu and Angrist [2001], Brunello et al. [2009]).

[7] It increases earnings (Angrist and Krueger, 1991; Acemoğlu and Angrist, 2001) and lifetime wealth (Oreopoulos, 2007), boosts economic growth and improves intergenerational income distribution (Eckstein and Zilcha, 2002), and improves schooling (Oreopoulos et al., 2006) and health (Chou et al., 2010) of future generations. It also reduces wage inequality (Brunello et al. 2009), crime (Lochner and Moretti, 2004), and teenage fertility (Black et al., 2008).

are for developed countries, the benefits of compulsory schooling could be even higher in developing countries because first, human capital is scarcer in developing countries and second, students who are compelled to complete additional years of schooling are less likely to come from the lower end of the ability distribution due to the much lower enrollment rates in developing countries.[8] Compulsory schooling could also improve equity in educational outcomes as it forces everyone, albeit imperfectly, to complete a minimum level of schooling. In addition, the fall in the price of schooling—due to the substantial investment in schooling infrastructure—could benefit girls more than boys and rural areas more than urban areas because the price elasticity of schooling demand is found to be higher for girls and for rural residents (Schultz, 1985; Lavy, 1996; Alderman and Gertler, 1997; Orazem and King, 2008). Equalizing educational outcomes by gender and rural/urban residence is important for both equity and efficiency reasons. Schultz (2002) highlights the particular benefits of investing in women's schooling, such as better child health and schooling as well as reduced fertility.[9] Other studies show that investing in human capital in less-developed regions has higher returns, which implies that improving schooling outcomes in rural areas could be beneficial for efficiency reasons as well.[10]

A key distinguishing feature of the compulsory schooling policy in Turkey is that it alters the sheepskin effects of schooling (i.e., the signaling effects of schooling, Spence [1973]) through its redefinition of the number of years of schooling required to obtain various diplomas. Acquiring a primary school diploma requires the completion of grade 5 before the policy, but the completion of grade 8 after the policy. The completion of grade 8 would give the students a secondary school diploma before the policy. Hence, the returns on the

[8] In fact, Psacharopoulos (1994) reports higher wage returns on education in developing countries than in developed countries; however, these estimates are not based on exogenous changes in schooling. There is a wide literature that reports, in developing-country contexts, positive effects of education on market as well as non-market productivity. While admitting that the estimated effects in this literature might suffer from biases due to unobserved heterogeneity, Strauss and Thomas (1995, p. 1886) state that the conclusion regarding the beneficial effects of schooling is unlikely to be overturned once unobserved heterogeneity is duly accounted for.

[9] Thomas and Strauss (1992) show that mothers' education improves child health through its effect on the quality of child care provided by the mother and the mother's ability to mitigate adverse shocks. Lillard and Willis (1994) find that mothers' schooling has a stronger positive effect on daughters' schooling, compared to fathers' schooling, in Malaysia.

[10] Fleisher et al. (2010) finds that investing in human capital has higher returns in the less-developed regions of China. Mejia and St-Pierre (2008) show that unequal opportunities in education could lead to a lower level of average human capital even when there are no financial constraints.

completion of both grade 5 and grade 8 of schooling fall with the policy due to the loss of the sheepskin effects of acquiring a primary school diploma and a secondary school diploma, respectively. In other words, while the productivity effects conditional on years of schooling do not change, the sheepskin effects conditional on years of schooling change. Since the sheepskin effects are more important for men than for women—due to the much lower labor-force participation of women in Turkey—and in urban areas than in rural areas—due to much higher self-employment in rural areas—the sheepskin effects could counteract the equalizing effect of the policy on schooling disparities by gender and rural/urban residence.

Another interesting feature of our policy is the magnitude of its impact on the student body. The number of students in grades 1 to 8 increased from about 9 million to 10.5 million within a period of three years following the policy: a 15-percent rise compared to the 1-percent fall in the preceding three years. This is due to both the large number of additional years that are made compulsory (3 years) and the high drop-out rate in non-compulsory schooling grades before the policy.[11] Even more interesting is the huge spillover effects of the policy on post-compulsory schooling. These make the 1997 compulsory-schooling policy in Turkey one of the education policies with the highest impact on enrollment ever examined.

In our empirical analysis, we use the 2003 and 2008 Demographic and Health Surveys data for Turkey, which are nationally representative. The key feature of our dataset is that it includes information on childhood place of residence at age 12; therefore, we are able to identify urban–rural residence at the age at which individuals in our sample make their schooling decisions. In the identification of the policy effect by gender and rural/urban residence, we compare the birth-cohorts that are affected by the policy with those that are not within a regression discontinuity design, where we allow the time trends in schooling outcomes to be different before and after the discontinuity. We use various subsamples—defined by gradually taking narrower time intervals around the discontinuity—and various polynomial specifications conditional on the width of the time interval. Checking the robustness of our findings using this gradual clustering of the sample around the discontinuity makes our identification strategy similar to a non-parametric approach.

The features of the experiment in our study allow for a clean identification. First, the

[11] In 1997, just before the implementation of the policy, the net enrollment rate in secondary schooling, the first level of non-compulsory schooling, was only 52 percent (World Bank).

policy is independent of potential schooling outcomes because the implementation of the policy was unexpected and its timing was a result of the surprising political developments of the period. Second, as stated earlier, the effect of the policy is realized in a short period of time and is huge in magnitude. Third, there are no concerns about endogenous program placement and participation—unlike in several other similar program evaluation studies in developing countries—due to the universal nature of the policy.

We find that the policy has a tremendous impact on the schooling attainment of all subgroups. For instance, the completed years of schooling at age 17 increases by about 1.3 years for rural men and by about 1.5 years for rural women (the most disadvantaged group). Moreover, an important part of this improvement comes from the spillover effects of the policy on the completion of non-compulsory high school grade levels. The policy equalizes the educational attainment of urban and rural children substantially. The urban–rural gap in the completed years of schooling at age 17 falls by 0.5 years for men and by 0.7 to 0.8 years for women. However, there is no evidence of a narrowing gender gap as a result of the policy. On the contrary, we find that the gender gap in urban areas in post-compulsory schooling (grades 9 to 11) increases. Within a conceptual framework of human capital investment decisions, this finding can be rationalized only by the stronger sheepskin effects for men in urban areas, resulting from the substantial difference in the labor-force participation rates of men and women. This implies that lowering the cost of schooling, by providing free and accessible schooling, is not sufficient to eradicate the gender gap in Turkey, despite its substantial positive effect on girls. School availability must be combined with other policies that especially target girls to eradicate the gender gap.

The rest of the paper is organized as follows. Next, we explain the education system as well as the new compulsory schooling policy in Turkey. In Section 3, we discuss the conceptual framework for the interpretation of our findings. In Section 4, we present the data and descriptive statistics. In Section 5, we discuss the identification method and estimation. This section is followed by a presentation of the results in Section 6. Section 7 concludes.

2 Education System in Turkey and the New Compulsory Schooling Policy

Prior to 1997, the education system in Turkey was built on a 5+3+3 system, which meant five years of compulsory primary, three years of non-compulsory lower secondary, and three years of upper secondary schooling. In 1997, the government of Turkey increased compulsory education from five to eight years by merging the first two levels under the umbrella of basic education. Although the extension of compulsory schooling was not a new issue, its enactment in the summer of 1997 was politically motivated. The secular government at the time seized the opportunity to curb religious education by extending compulsory schooling.[12] The Turkish Ministry of National Education (MONE) reacted to the challenge of accommodating new students by expanding the number of classes in existing schools, by bussing rural children to nearby schools, and by constructing boarding schools primarily for children living in distant rural areas.[13] MONE's share in the public investment budget, which was around 15 percent in 1996 and 1997, jumped to 37.3 percent in 1998 and remained high at around 30 percent until 2000 (see Appendix Table A1).

Figure 1 depicts the changes in the student population in basic education (8-years of schooling) in rural and urban areas in panels (a) and (b), respectively. Since the policy did not bind the students who finished the fifth grade in the 1996-97 school year, which earned them a primary school diploma, the jump in the 6th grade student population took place for the first time in the 1998-99 school year. From the 1997-98 school year to the 2000-01 school year, the number of students in urban areas increased from around 6.75 to 7.67 million—a

[12] This fulfilled their goal in two ways. First, it eliminated lower secondary religious schools (*Imam-Hatip*), where both religious and secular courses were given, by making this level a part of compulsory secular schooling. While Imam-Hatip schools were originally established to train government-employed imams, the students in these schools could go on to secular education and major in any field at university. In the 1996-97 school year, 11.5 percent of male and 13.1 percent of female secondary school students were enrolled in this type of schools. Almost all of these schools were in urban areas; less than 1 percent of rural children were enrolled in these schools. Second, the new policy delayed enrollment in Quranic Studies, which involved only religious education but could be done only after the completion of compulsory schooling, by an additional three years.

[13] In urban areas, the high lower secondary school attendance prior to the extension of compulsory schooling meant that physical capacity was already there, which could be used more efficiently to accommodate the rising demand through practices like the double-shift system, where some children go to school in the morning and some in the afternoon. Even without such schemes, the merging of primary and lower secondary schools probably increased the efficiency at which the existing capacity could be used.

13.7-percent increase—compared to the 1.8-percent increase in the preceding 3-year interval and the 0.5-percent increase in the succeeding 3-year interval. The number of students in rural areas rose from around 2.35 to 2.8 million over the same period, which is equivalent to a 20-percent increase compared to the 7-percent fall in the preceding 3-year interval and the 1.4-percent fall in the succeeding 3-year interval (due to rural to urban migration).

Figure 2 suggests that not only compulsory school attendance but also high school attendance was favorably affected by the policy in both rural and urban areas. The number of high school students in urban areas increased from 2.27 million in the 2000-2001 school year to 2.88 million in the 2003-2004 school year, which is equivalent to a 27-percent increase, in contrast to the 10.5-percent increase in the preceding 3-year interval. Note that the 10.5 percent increase in the preceding 3-year interval is also influenced by the policy as this period is after the announcement of the policy. The increase in high school enrollment in the 3-year interval before the announcement of the policy was 3.5 percent. Similarly, the number of high school students in rural areas displays a much larger increase between the 2000-01 and 2003-04 school years, when the first cohort forced to attend the 6th grade reaches high school age.

MONE utilized two key instruments in the implementation of the new policy: bussing rural children to nearby schools and the construction of boarding schools at the basic education level. Figure 3 shows the dramatic change in the number of children bussed to school, which rose from 127,683 students in the 1996-97 school year (before the policy) to 621,986 students in the 1999-2000 school year. This change accounts for most of the remarkable increase in the number of students in compulsory education in rural areas, given in Figure 1. With this grand bussing scheme, several small schools in rural areas that could not provide the facilities for all grades from 1 to 8 were closed.

The other key instrument that MONE utilized in the implementation of the new policy was the construction of boarding schools that housed all grade levels (1 through 8) and were free of charge. Figure 4 illustrates the changes in the number of these schools and in the number of students attending them over time. In the 1996-97 school year, 34,465 students were enrolled in these schools. This number increased to 281,609 in the 2001-02 school year. These boarding schools, as well as the bussing scheme, would substantially decrease the cost

of schooling in grades 6 to 8 (the new compulsory grade levels) because these schooling levels were not locally available in most rural areas prior to the policy, which meant that children had to travel to the nearest town or live with relatives residing in towns to attend these grade levels.

Next, we examine the expansion in the number of classrooms with the policy. This increase results from the construction of new schools, including boarding schools, as well as from the expansion of the capacity of the existing schools. Figure 5 shows that there was a substantial increase in the total number of classrooms with the policy in both rural and urban areas. Before the policy, between the 1991-92 and 1997-98 school years, the number of classrooms in urban areas ranged between 150,000 and 170,000. After the policy, the number of classrooms in urban areas increased from 169,202 in the 1997-98 school year to 218,093 in the 2001-02 school year. After the 2001-02 school year until the 2004-05 school year, the number of classrooms in urban areas was again relatively stable at around the 210,000–230,000 range.

Before the policy, there was a steep decline in the number of classrooms in rural areas due to the rapid rural to urban migration in Turkey. In fact, the number of classrooms in rural areas decreased from 219,162 in the 1991-92 school year to 148,516 in the 1997-98 school year. The fall in the number of students continued in the first year after the law went into effect due to the closure of some rural schools and the bussing of children to more central localities. Nonetheless, the number of classrooms climbed back up from 135,717 in the 1998-99 school year to 170,046 in the 2002-03 school year as MONE increased its investment budget. After the 2002-03 school year, the number of classrooms in rural areas reverted back to its pre-policy downward trend, with the continuing outmigration from rural areas, and fell to 152,343 in the 2005-06 school year.

We also examine the change in the number of classrooms in high schools in order to see whether the capacity in high schools could meet the rising demand as the number of students reaching high school grade levels surged with the new compulsory schooling policy. As can be seen in Appendix Figure 1, there is a noteworthy rise in the number of classrooms in high schools after the 1997-98 school year in both rural and urban areas.

Finally, we examine the changes in certain measures of school quality as deterioration in

school quality could affect enrollment, as well as human capital accumulation of students. The student-to-classroom ratio increased during the first few years after the policy. (There had already been a slightly rising trend before the policy.) It rose from 28.6 in the 1997-98 school year to 31.2 in the 1999-2000 school year. However, as MONE's investments materialized, this ratio fell back to 28.3 in the 2001-02 school year and kept declining. On the other hand, MONE was able to adjust the number of teachers immediately. The student-to-teacher ratio remained constant at around 30 in the first few years after the policy, and started decreasing after the 2000-01 school year, falling below 28 by the 2002-03 school year. Therefore, there is no significant detrimental effect of this policy on school quality.

3 Conceptual Framework

In a standard model of optimal schooling investment decisions, where individuals maximize lifetime earnings, extending compulsory schooling would only decrease individuals' welfare because it restricts choice. Nonetheless, there are a number of motivations for longer compulsory schooling. First, individuals could make suboptimal decisions due to financial constraints, especially in developing countries, and compulsory schooling—by providing free schooling and thereby, lowering the price of schooling—prevents this to some degree.[14] Second, there are positive externalities of schooling, which individual decision making does not account for. Third, in socially conservative countries, there are frequently adverse cultural and social norms, which increase the costs of children's schooling from their parents' perspective, resulting in sub-optimal choice for the child when the goals of the parents and children do not overlap. Fourth, children as well as their parents, especially in poorer countries, may lack information and underestimate the returns to education.[15] Finally, children may make irrational decisions; for instance, they may be myopic (see, e.g., Laibson, 1997; O'Donoghue

[14] As outlined by Orazem and King (2008), in a model of local schooling market where both demand and supply factors are at work, we can interpret the expansion of compulsory schooling—and the mandatory provision of grades 6 to 8 to all children by the state—as a full subsidy on school provision. Orazem and King show that such a subsidy unambiguously increases schooling and decreases its price.

[15] There is evidence for this in developed-country settings. For instance, Dominitz et al. (2001) report, for the US, that students' expectations about returns on schooling are often very much off the mark. Eckstein and Wolpin (2000) find that drop-outs in the US are those who anticipate very little reward from graduation.

and Rabin, 1999) and give too much weight to present costs of schooling.[16] Several of these potential causes of suboptimal education decisions—in particular, financial constraints, the agency problem, and the information problem—are likely to be more prevalent in rural areas. Furthermore, gender may interact with rural residence to produce worse outcomes for rural girls. Therefore, compulsory schooling policies could be especially effective for girls and rural residents.

In order to understand how the new compulsory schooling policy in Turkey affects the schooling differences by gender and rural/urban residence at age 12, we first need to understand the causes of those differences in schooling outcomes. For this purpose, we first outline a simple model of individuals' optimal schooling duration decisions. Then, within this model, we discuss how the new compulsory schooling policy changes the costs and benefits.

3.1 Understanding Schooling Differences by Gender and Rural/Urban Residence

The duration of schooling decision is determined by the trade-off between the discounted value of higher future earnings capacity and the direct as well as indirect costs of schooling in the present. According to the human capital theory, schooling is an investment activity that increases worker productivity (Schultz, 1963; Mincer, 1974; Becker, 1975). The signaling hypothesis emphasizes the role of education as a filtering mechanism in environments of imperfect information (Spence, 1973). The information gap between an employer and an employee as to the employee's productivity is resolved by a signal in terms of educational attainment that the employee sends. Therefore, there is an additional benefit of completing a certain schooling level—often referred to as the "sheepskin effect"—in addition to its productivity effect.[17]

The costs of schooling include direct monetary costs like transportation costs and pur-

[16] Oreopoulos (2007) reports that when asked whether leaving high school was a good decision, 52.9 percent of dropouts in the US said no. In addition, Oreopoulos estimates the lifetime opportunity cost of leaving school early in the US, Canada, and Australia and finds that the cost of education had to be extremely high to offset the pecuniary benefits of schooling, not including the non-pecuniary benefits. We can expect this to hold in Turkey as well because dropouts are less likely come from the lower end of the ability distribution than those in Oreopoulos' study.

[17] Empirical support for the sheepskin effects is found in various contexts: Jaeger and Page (1996) in the US; Schady (2003) in the Philippines; and Munich et al. (2005) in the Czech Republic.

chases of school supplies, and indirect costs in the form of the opportunity cost of school time like foregone wages and home production, as well as the psychic costs of sending children to school. These costs would be lower during compulsory schooling years because the state ensures the availability and accessibility of schools to all children of compulsory schooling age. In addition, there are costs associated with not complying with compulsory schooling, which include both monetary elements—like the penalties imposed by the state—and psychic elements that result from not complying with the legal machinery. We could interpret these non-compliance costs as a negative cost of schooling attendance. Another factor that influences the duration of schooling decision is the discount rate, which weighs the future benefits of schooling against its present current costs. The value of the discount rate would be higher for poorer households.

In this framework, several factors contribute to a lower demand for the schooling of girls in Turkey. First, due to the distinctly lower labor-market participation rates for women in Turkey (25 percent vs. 70 percent in 2008 [TUIK, 2012]), the higher earnings capacity resulting from schooling would be less important for girls. It is not obvious whether the opportunity cost of schooling would be higher for boys or girls because while boys are more likely to work in the market, the value of girls' home production would be higher. On the other hand, the psychic costs of schooling would be especially high for girls due to the social norms in Turkey. For instance, the cost of traveling away from home to go to school as well as the cost of attending co-ed schools would be much higher for girls than for boys. There is no reason to expect the cost of not complying with the policy to differ by gender. Finally, the value of future earnings would be discounted more for girls as daughters are more likely to move away from their parents after marriage (Becker, 1985).

The benefits of schooling, in particular the sheepskin effects, are likely to be larger in urban areas than in rural areas due to the higher prevalence of wage employment in the former – the sheepskin effects matter more in wage employment as compared to self-employment and agricultural work (Wolpin, 1986; Glewwe, 2002).[18] The opportunity cost of schooling would surely be higher in rural areas as field work is readily available. In addition, the monetary as well as psychic costs of schooling would also be higher due to the longer distances to

[18] Using household data from 46 developing countries, Orazem and King (2008) find higher returns on schooling for urban residents than for rural residents.

schools.[19] The discount rate would also be higher in rural areas as residents of rural areas are on average poorer in Turkey. Finally, the enforcement of compulsory schooling would be more difficult in rural areas, implying a lower cost of non-compliance. All these factors contribute to a lower schooling demand in rural areas.

3.2 Effect of the Policy

The new compulsory schooling policy in Turkey affects both the benefits and costs of schooling. It brings about an important fall in the costs of schooling in grades 6 to 8 due to the increased classroom capacity in both urban and rural areas, but particularly in rural areas as illustrated in Section 2. With this fall in the price of schooling, the groups for whom the price elasticity of schooling demand is higher would be affected more. Alderman and Gertler (1997) theoretically show—under the same assumptions on market incentives or parental preferences that lead to higher school attainment for girls than for boys—that the price elasticity of schooling demand is higher for girls. There is also substantial empirical support for this finding.[20] In fact, Orazem and King (2008, p. 3521) review a large body of empirical analyses and conclude that "In places where girls receive less schooling than boys (South Asia and the Middle East, rural areas of many countries), the elasticities of girls' schooling with respect to income and prices are higher than for boys." Thus, we assume that the price elasticity is also higher for girls than for boys in Turkey in the interpretation of our empirical findings. This implies that the fall in the price of schooling with the new policy would decrease the gender gap in Turkey, particularly in rural areas where the drop in schooling costs is especially high. In addition, to the degree that credit constraints impede school enrollment, the price elasticity of schooling demand would be higher in rural areas where average family income is lower. In fact, Orazem and King also report that the elasticity of schooling demand with respect to distance to school is higher in rural areas. Thus, rural areas would benefit more than urban areas from the fall in the price of schooling not only due to the larger magnitude of this fall but also due to the larger price elasticity of schooling

[19] Glewwe and Jacoby (1994), Alderman et al. (1996), Lavy (1996), and Glick (2008) report negative association between distance to school and educational outcomes in various developing countries.

[20] Schultz (1985), in a cross-country analysis, finds that girls' school enrollment is more price elastic; Lavy (1996) and Tansel (1997) find that girls' schooling is more responsive to distance to school both at primary and secondary school levels in Ghana than boys' schooling.

demand there.

In terms of benefits, the policy could influence both the productivity and the sheepskin effects of schooling. The sheepskin effects are substantially altered by the policy due to the redefinition of schooling tiers. First, the sheepskin effect of completing five years of schooling (primary school diploma before the policy) no longer exists. Second, the marginal sheepskin effect of completing 8 years of schooling (secondary school diploma) is eliminated with the policy. The sheepskin effect of completing 8 years of schooling after the policy is equivalent to the sheepskin effect of completing 5 years of schooling before the policy because those with 5 years of schooling before the policy and those with 8 years of schooling after the policy occupy roughly the same part of the ability distribution, and both groups hold a primary school diploma.[21] Therefore, to distinguish themselves from the large pool of primary school graduates, students who would complete 8 years of schooling in the absence of the policy would have to finish 11 years of schooling (high school) with the policy. The reduced benefits of 5 and 8 years of schooling—due to lost or diminished sheepskin effects—would be especially important for men as their labor-force participation rate is much higher and for urban residents as they are less likely to be self-employed.

These changes in sheepskin effects also explain why we might see spillover effects of the policy on high school grade levels. First, some of those who would choose 8 years of schooling in the absence of the policy could choose 11 years of schooling with the policy because the sheepskin effects of 8 years of schooling is reduced. Second, a person who would choose compulsory school (5 years) over high school (11 years) before the policy could choose high school (11 years) over compulsory school (8 years) after the policy because of both the reduction in the sheepskin effects of completing grades 5 and 8 and the fall in the marginal cost of high school over compulsory school by the cost of three years of schooling. This event becomes even more likely when the marginal benefit of 8 years over 5 years is not as high as the marginal benefit of 11 years over 8 years. In fact, as can be seen in Table A2 of the Appendix, earning a secondary school diploma over a primary school diploma increases the wage rate by 12 percent whereas earning a high school diploma over a secondary school diploma increases it by 30 percent. Third, after being compelled to complete another three

[21] The non-compliance rates before and after the policy are similar.

years of schooling, some students could change their mind about high school enrollment due to improved information on the returns on schooling, higher ability of asserting their will against that of their parents, and/or a lower probability of irrational decision making as an older individual, as discussed earlier.

In the absence of sheepskin effects, spillover effects could still take place if there is a fall in the productivity of 8 years of schooling vis-à-vis that of 11 years of schooling. Such changes in productivity could be brought about by the general equilibrium effects resulting from the change in the supply of workers with different schooling levels. In particular, the productivity of workers with 8 or more years of schooling could decline due to the increase in their supply. However, in their study that tests human capital and sorting models against each other, Lang and Kropp (1986) argue that the effect of compulsory schooling laws on those not constrained by the laws—which would be equivalent, in our context, to those who would finish 8 or more years of schooling in the absence of the policy—should be "near zero." Some of the reasons that they put forward in explaining this assertion are valid in our context as well. First, the rise in the supply of workers with 8 or more years of schooling in the labor market would be gradual; it would take many years until a significant rise in the supply takes place. Second, substitutability among workers with different skill levels would diminish the effect of the rising labor supply of certain skill groups. In addition, there is a particular feature of the Turkish context that would dissipate the general equilibrium effects. Due to the strong spillover effects, not only the supply of workers with 8 years of schooling, but also the supply of workers with higher schooling levels rises significantly. Therefore, it is not clear whether the returns on 8 years of schooling will fall much compared to the returns on 11 years of schooling—even in the long run and without substitutability of workers with different skills—because the supply of both workers with 8 years of schooling and workers with 11 years of schooling rise. In essence, we would expect the general equilibrium effects to be quite small especially in comparison to the sheepskin effects, as in Lang and Kropp (1986), given that sheepskin effects in our context are much stronger than those in Lang and Kropp, due to the redefinition of schooling tiers in Turkey.[22]

Changes in the productivity of schooling could take place via other channels as well. One

[22] Using the same methodology, Yüret (2009) tests the human capital model vs. the sorting model in the Turkish context. His findings are in support of the sorting model.

such channel is school quality; however, school inputs that affect productivity such as class size and teacher-to-student ratio do not exhibit a significant deterioration, as explained in Section 2. Another factor that could affect productivity is the change in the curriculum for students who would take technical education at the secondary school level in the absence of the policy. For these students, we might expect a fall in productivity conditional on completing 8 years of schooling. However, in the 1996-97 school year (just before the policy), the fraction of students in secondary school who were enrolled in technical schools was only 1.3 percent.[23]

In understanding the impact of the new compulsory schooling policy on the schooling of various groups, there are also selection dynamics to consider. As noted earlier and will be demonstrated shortly, drop-out rates—even in compulsory schooling levels—differ considerably by gender and rural/urban residence. Due to the higher drop-out rates of girls and rural residents in lower grades, those who make it to higher grades among these groups are likely to be a more select group with stronger school attachment.

4 Data

The data for this study come from the 2003 and 2008 Turkish Demographic and Health Surveys (DHS), both of which are nationally representative. The main advantage of DHS over other data sources for the purposes of this study is that it provides information on the location of residence at age 12, which allows us to identify rural/urban residence at ages that are pertinent to the schooling decisions examined in this study. Another advantage of DHS is that it provides information not only on the highest schooling level but also on the highest grade completed. We rely mainly on the latter information, which is lacking in other Turkish data sources, to track the changes occurring in educational attainment in Turkey.

Students who complete grade 4 or a lower grade in the 1996-97 school year are covered by the policy (i.e., students who do not have a primary school diploma by the beginning of the 1997-98 school year). This means that the first cohort affected by the policy is the

[23] There is no reason to expect a fall in the productivity of students who would attend religious secondary schools in the absence of the policy, as most of these students work in jobs not related with their religious education.

one that begins grade 1 in the 1993-94 school year. Most children in Turkey start school at age 6. In that case, children who are born after September 1986 would be affected by the policy. However, a considerable fraction of children delay starting school to age 7. Among these children, those who are born after September 1985 would be affected by the policy. Our sample covers those who are born between 1975 and 1996 with the exception of those born in 1985 and in 1986. We drop these two cohorts because of the fuzziness in their treatment status, as explained above. Hence, our sample includes 10 birth-cohorts who are not affected by the policy (1975–86) and 10 birth-cohorts who are affected (1987–96). The female sample in our analysis is drawn from the 2003 and 2008 surveys, whereas the male sample is drawn only from the 2008 survey because information on the location of residence at age 12 is not available for men in the 2003 survey. As a result, while the female sample includes 14,851 observations, the male sample includes 7,860 observations. Table 1 provides descriptive statistics for the variables used in the estimation. About 39 percent of men and 36 percent of women live in rural areas.

Figure 7 displays the change in the fraction completing selected grade levels in four panels: panel (a) for urban men, panel (b) for urban women, panel (c) for rural men, and panel (d) for rural women. The selected grade levels are grade 5 (last year of pre-reform primary school), grade 6 (first year of new compulsory schooling years), grade 8 (last year of new compulsory schooling years), grade 9 (first year of high school), and grade 11 (last year of high school). The key feature in all panels is the remarkable jump in the fraction completing grades 6 to 8 at the time of policy. This is particularly visible in rural areas, partly due to the lower pre-policy levels. In fact, while the fraction completing grades 6 to 8 for rural women is around 0.2 before the policy, it is above 0.6 after the policy. At the same time, Figure 7 suggests that the effect of the policy is not limited to grades 6 to 8. In all panels, there is a substantial rise in the fraction completing grades 9 to 11 as well, which are not compulsory post-reform. For instance, while the fraction completing grades 9 to 11 for urban men is around 0.7 before the policy, it is above 0.8 after the policy.

Another important feature of the profiles in Figure 7 is the time trends. These time trends exist both before and after the policy and are quite strong in some cases. For instance, for rural men, the fraction completing grades 6 to 8 rises from just above 0.4 to almost 0.6

within the 10 years before the policy. Moreover, the time trends before and after the policy differ significantly for certain groups. For example, for both urban and rural women, the time trend in the fraction completing grades 6 to 8 after the policy is stronger than that before the policy. In all panels, separate linear lines are fitted to the profiles before and after the policy. As can be seen from the graphs, these linear lines do a good job of capturing the time trends.

Figure 7 also shows important pre-policy differences in schooling attainment across subpopulations. Women lag behind men and rural residents lag behind urban residents in terms of school attainment. In addition, the gender gap is stronger in rural areas: put differently, the urban–rural gap is stronger for women. What is also visible from Figure 7 is less than full compliance with compulsory schooling before the policy; a notable fraction of students do not complete grade 5, which is most visible for rural women.

5 Identification Method and Estimation

As can be seen from Figure 7, the structure of our data fits the regression discontinuity design well. There is a discontinuous jump at the time of the policy, and the relationship between the measured outcome—the completion rate of a certain grade level—and the assignment variable—year of birth—is continuous.[24] The data generating process, without distinguishing across subpopulations for notational simplification, can be expressed as follows:

$$E(Y_{0i}|x_i) = \alpha + \beta_{01}x_i' + \beta_{02}x_i'^2 \quad (1)$$

$$E(Y_{1i}|x_i) = \alpha + \rho + \beta_{11}x_i' + \beta_{12}x_i'^2 \quad (2)$$

$$x_i' = x_i - x_0 \quad (3)$$

where Y_0 and Y_1, respectively, are the outcome variables before and after the policy and x is the year of birth. We normalize the year of birth using x_0, which coincides with the time of discontinuity. To account for the time trends in the outcome variable, we take polynomials

[24] van der Klauuw (2008) and Lee and Lemieux (2010) provide reviews of the regression discontinuity design. Hahn et al. (2001) construct a theoretical framework of this methodology; Angrist and Lavy (1999) and van der Klauuw (2001) are some of the earliest applications of it.

up to the second order, which are allowed to be different before and after the policy. The effect of the education policy on the outcome variable is denoted by ρ. Hence, the model we estimate takes the following form:

$$Y_i = \alpha + \beta_{01} x_i' + \beta_{02} x_i'^2 + \rho D_i + \beta_1^* D_i x_i' + \beta_2^* D_i x_i'^2 \tag{4}$$

$$\beta_1^* = \beta_{11} - \beta_{01} \tag{5}$$

$$\beta_2^* = \beta_{12} - \beta_{02} \tag{6}$$

where D denotes the treatment variable, which is 1 when the assignment variable (year of birth) is greater than 1986, and 0 otherwise.[25] In the estimation of equation (4), we run a logistic regression for each grade level (1 through 11) separately, where the dependent variable (grade-completion status) is 1 if the individual completed that grade level, and 0 otherwise. We also include the location of residence at age 12 in the form of the size of the location (large city, small city, and village) and the region of the location (West, Central, South, North, and East) as control variables in the estimation of equation (4) to improve efficiency. (We check the sensitivity of our coefficient estimates to the inclusion of these control variables.)

We run four sets of regressions to examine any differential effects of the policy: (i) by gender in urban areas, (ii) by gender in rural areas, (iii) by rural/urban residence at age 12 for men, and (iv) by rural/urban residence at age 12 for women. We allow all the parameters in equation (4)—the constant term, all trend parameters, and the key policy parameter—to vary across subgroups. For instance, in the examination of differential effects by gender, the regressions include interactions of the policy dummy and the time trend variable with the female dummy, as well as the female dummy itself.

The critical issue in our identification strategy is to disentangle the effect of the education policy from the time trends in our measured outcome. As illustrated above, we account for the time trends by polynomial splines—separate polynomials on both sides of the cut-off. In

[25] Our identification strategy is similar to that in Oreopoulos (2006). However, Oreopoulos does not allow the time trends to be different before and after the policy. He uses higher-order polynomials as the time interval of his analysis is much wider.

this case, the question that arises is whether or not the results are sensitive to alternative and less-restrictive polynomial specifications. The risk of misspecification would fall when we take narrower windows around the discontinuity. In fact, as stated by van der Klaauw (2008, p. 235), "A linear control function is likely to provide a reasonable approximation of the true functional form within a small neighborhood of the cut-off." However, the problem with restricting the sample to birth-cohorts that are just above and below the cut-off is the fall in efficiency, particularly so given our relatively small sample. Therefore, we take a number of data intervals around the cut-off and alternative polynomial specifications that depend on the width of the data interval.

We start with 10-year intervals on both sides of the cut-off (1975–84 and 1987–96 birth cohorts). Within this interval, we use two different models to account for the time trends. While linear polynomial splines are used in model A1, quadratic polynomial splines are used in model A2. Then, we trim the tails of the interval and take 5-year intervals on both sides of the cut-off. In this case (which we call model B) we take only linear polynomial splines on both sides of the discontinuity. Model C also incorporates linear polynomial splines; however, the time frame is further reduced to include 3-year and 4-year intervals on both sides of the cut-off, depending on the subpopulation under study and its sample size. This is the narrowest time-interval that allows us to separate the effect of the policy from that of the time trend given the sample size. As can be seen in Figure 7, linear polynomial splines provide a good approximation to the time trends for most subpopulations. Finally, Model D includes the shortest-time interval—2 years around the cut-off—but no time trends.

The above approach of taking subsamples that are clustered around the cut-off by trimming the tails of the sample interval, which puts no weight on observations at the tails, is similar in a way to non-parametric modeling. As argued by Lee and Lemieux (2010, p. 284), "...the procedure of regressing the outcome Y on X and a treatment dummy D can be viewed as a parametric regression, or as a local linear regression with a very large bandwidth. Similarly, if one wanted to exclude the influence of data points in the tails of the X distribution, one could call the exact same procedure 'parametric' after trimming the tails, or 'nonparametric' by viewing the restriction in the range of X as a result of using a smaller bandwidth."

The validity of our identification strategy requires that the timing of the policy be independent of the realizations of the outcome variable. For instance, if the policy were passed in a period of low grade-completion rates, this requirement would fail. However, as explained in Section 2, the timing of the policy was determined by the political developments of the time, which were completely independent of educational outcomes. The validity of our identification strategy also requires that there be no other policy change at the same time that affects schooling decisions. Education policies are likely to coincide with other policy interventions on health, infrastructure, or social services that would also influence schooling outcomes because the timing of all these policies depend on the availability financial resources. However, the timing of the Turkish policy was related to the political actors' ideological agendas on education and did not coincide with other social programs. The other two notable educational programs of the last decade in Turkey were implemented much later than 1997. The public CCT program was first implemented in 2003, and another NGO-driven CCT program targeting girls only (*Baba Beni Okula Gönder*) started in 2005. Our identification with subsamples involving shorter time intervals would not be affected by these policies. In subsamples with longer time intervals, the effects of these programs, as well as of their interaction with the compulsory schooling policy, would be captured by the time trend after the discontinuity. In any case, the effects of these programs would be trivial compared to that of the compulsory schooling policy due to the limited number of program beneficiaries.

Our identification strategy is not contaminated by endogenous program placement or participation, which could be a problem in other supply-side policies reviewed earlier like school construction programs. As argued by Rosenzweig and Wolpin (1986), these programs are likely to be placed in areas where they are more likely to be successful. However, the policy in our study is universal, and therefore, schooling infrastructure for the new compulsory grades is provided everywhere. The universal application of our policy also prevents another common problem: parents who care more about their children's schooling are also more likely to migrate to areas where schools are constructed (Rosenzweig and Wolpin, 1988).

6 Results

The empirical results regarding the effects of the policy on schooling outcomes are presented separately by gender and place of residence. In each part, we first illustrate the estimated parameters for the effect of the policy on different subgroups at each grade level; then, based on these estimates, we illustrate how the predicted gaps across subgroups change as a result of the new policy. We interpret our findings within the conceptual framework outlined in Section 3.

6.1 Analysis by Gender in Urban Areas

Our first set of analysis involves an investigation of the gender gap in urban areas. Table 2 presents the estimation results of equation (2) by grade level for the five different models explained above. The "policy" row shows the effect of the policy for men, the "policy*female" row shows how the effect of the policy for women is different from that for men, and the "composite female" row gives the cumulative effect for women, that is, the sum of the coefficient estimates of "policy" and "policy*female" variables.

As can be seen from Table 2, there is a positive effect of the policy for both men and women not only in grades 6 to 8 but also in grades 9 to 11. In other words, there is a spillover effect of the policy on post-compulsory schooling grade levels. Next, we examine the coefficient of the interaction term of the policy and female variables to see if there is any differential effect of the policy by gender in urban areas. The coefficient for grades 6 to 8 is negative and large in magnitude in all specifications; however, it is statistically significant only in models A1 and D. Therefore, we cannot claim a robust differential impact of the policy by gender in urban areas in grades 6 to 8. The coefficient for grades 9 to 11 is also negative and even larger in magnitude than that for grades 6 to 8. Moreover, its statistical significance is higher; for instance, in grade 9, it is statistically significant at least at the 5-percent level in all models.[26] Thus, we can conclude that the policy has a weaker effect on post-compulsory schooling for urban women than for urban men.

[26] In grade 10, it is statistically significant in models A1, B, and D. The sample size becomes smaller in grades 10 and 11; more importantly, the variation in the policy variable is reduced due to the lower number of birth-cohorts that are affected by the policy.

Table 3 displays the changes in the predicted grade-completion rates with the policy for men and women, as well as the change in the gender gap in grade-completion rates. These changes take into account not only any differential policy effect between men and women (presented in Table 2) but also the baseline grade-completion rates, which are lower for women. Despite the sizeable negative coefficients for the female interaction of the policy variable in grades 6 to 8 in Table 2, the change in the gender gap in the completion of these grade levels is almost zero (except in model A2) in Table 3. This stems from the lower starting values for women in the completion of grades 6 to 8 (as can be seen in Figure 6). For instance, the completion rate of grade 8 increases by 11–13 percentage points for men and 11–19 percentage points for women.

However, the improvement in the fraction of women completing grades 9 to 11 lags behind that of men, as with the effectiveness of the policy in Table 2. For instance, the improvement in the completion rate of grade 9 is about 10 percentage points higher for men than for women. (This is statistically significant at the 1-percent level in models A1, B, and D, and just marginally insignificant at the 10-percent level in models A2 and C.) Put differently, while the improvement in the completion rates of grades 9 to 11 is much lower than that of grades 6 to 8 for women in all models (5–10 percentage points lower) the former is higher than the latter for men in all models. This implies that not only is the policy more effective in improving the completion rates of high school grade levels for men but it also increases the gender gap in the completion of high school grade levels.

In sum, while the policy does not narrow the gender gap in the completion of the newly mandated grade levels, it widens the gender gap in post-compulsory levels. There is not much change in schooling costs during the post-compulsory schooling years. However, given the dynamic nature of schooling decisions, the lower costs in grades 6 to 8 also imply a lower total cost of completing high school. Since the price elasticity of schooling demand is higher for girls, we would expect a stronger effect on girls. However, the findings for grades 9 to 11 in Table 2, on the contrary, point out a weaker effect on girls. Part of this results from the fact that the fall in schooling price (and thus, the price elasticity effect) is not as important in urban areas as it is in rural areas. Another factor that would have a bearing on the widening gender gap in post-compulsory schooling is the selection issue: the difference in the

average characteristics of the male and female samples that are treated by the policy would cause the effect of the policy to vary by gender. However, in this case, we would expect a stronger effect on women because women who are treated by the policy form a less-marginal group as compared to men due to their lower pre-policy completion rates. However, even then, this effect would be weaker in urban areas than in rural areas, due to the smaller pre-policy gender gap in the former. Therefore, within the conceptual framework of Section 3, the sheepskin effects remain as the only explanation for the widening gender gap in post-compulsory schooling in urban areas. Since the sheepskin effects are more important for men than for women—especially in urban areas due to the remarkable difference in labor-force participation rates by gender—the effectiveness of the policy would be higher for men, and this is what we find in Table 3.

6.2 Analysis by Gender in Rural Areas

Table 4 displays the effect of the policy on grade-completion by gender in rural areas. The policy has a positive effect on the completion of all grade levels from 6 to 11 for both men and women. In other words, spillover effects of the policy on high school grade levels exist in rural areas as well. In addition, there is no evidence of a differential policy effect by gender in rural areas in both grades 6 to 8 and grades 9 to 11.

As illustrated in Section 2, there is a substantial reduction in the costs of schooling in grades 6 to 8 in rural areas with the policy. Due to the higher price elasticity of the demand for schooling for girls than for boys, we would expect a stronger effect in grades 6 to 8 for girls. Although the gender interaction of the policy variable for grades 6 to 8 has a negative coefficient in all models but one in Table 4, it is not statistically significant. An explanation for this finding, within our conceptual framework, is that the stronger sheepskin effects of completing primary education for boys (as argued before) counteract the effect of the higher price elasticity for girls.

Compared to the coefficients of the female interaction of the policy variable for urban areas given in Table 2 of the previous subsection, the female interaction coefficients for rural areas are more positive in both grades 6 to 8 and grades 9 to 11. In particular, there is no evidence of weaker spillover effects for women than for men in grades 9 to 11 in rural

areas, unlike in urban areas. This fact could arise from a smaller gender difference in the importance of the sheepskin effects in rural areas. As the importance of the sheepskin effects for men diminishes in rural areas, the relative effectiveness of the policy for women vis-à-vis men would increase. Another explanation would be the higher price elasticity of schooling demand for women, along with the higher reduction in the costs of schooling in rural areas. This effect would be relevant not only in grades 6 to 8 but also in grades 9 to 11 because the reduction in schooling costs in grades 6 to 8 also lowers the cost of high school completion.

Table 5 presents the changes in the fractions of men and women completing grades 1 to 11, as well as the changes in the gender gap in each grade level. There is no evidence of a narrowing gender gap in the completion rate of any grade level in rural areas. Nevertheless, the improvement in the fraction completing grades 6 to 8 is substantial for both men and women. The fraction of women completing grade 8 is estimated to increase by 28–37 percentage points. The corresponding increase for men is slightly smaller. Another notable finding is the improvement observed in grades 1 to 3 for boys. It is likely that certain instruments of the new policy, like the bussing of rural students to schools in more central locations and the construction of boarding schools, which are available to students of all compulsory school grades, improve the schooling outcomes in earlier grade levels as well.

6.3 Analysis by Urban–Rural Residence for Men

Table 6 displays the estimation results for the effect of the policy by rural and urban residence for men. The policy has a positive effect on grade completion in all grade levels from 6 to 11 in both urban and rural areas.[27] In addition, there is a positive effect of the policy in grades 1 to 3 in rural areas, which is consistent with the finding in Section 6.2.

There is no evidence for a differential effect of the policy by rural and urban residence. At the same time, in grades 6 to 8, the rural interaction term of the policy variable is positive in four of the five models considered. The larger drop in the schooling costs, as well as the higher price elasticity of schooling demand, in rural areas can explain this fact. On the other hand, in grades 9 to11, the rural interaction term is always negative and quite sizeable in

[27]For a few model and grade-level combinations, the statistical significance is low. However, even in these cases, the coefficients are large in magnitude and very similar in levels to those with higher statistical significance.

magnitude in many cases. A number of factors contribute to this fact. First, the availability of schools is an important issue in grades 9 to 11 even after the policy, and urban areas are much ahead of rural areas in this. Thus, among children who are induced to finish 8 years of schooling with the policy, continuing their studies in high school is much easier for those in urban areas. Second, as argued before, the sheepskin effects of earning a high school degree are more valuable in urban areas. On the other hand, there is one factor that makes the policy more effective in rural areas. Just before the implementation of the policy, roughly 70 percent of urban men were in high school whereas 40 percent of rural men were. Therefore, the pool of men who are treated by the new policy in urban areas is more marginal, and accordingly, probably less able on average. This fact makes the policy more effective in rural areas. Besides, as argued above, the larger fall in the schooling costs in grades 6 to 8 in rural areas means a larger fall in the total schooling costs of completing high school.

Table 7 gives the changes in the fractions of men completing various grade levels in urban areas and in rural areas separately, as well as the change in the urban–rural gap. There is a significant improvement in the fraction completing grades 6 to 8 in urban areas, and even more so in rural areas. The rise in the fraction completing grade 8 is about 10–15 percentage points in urban areas and about 24–33 percentage points in rural areas. Consequently, the urban–rural gap in the fraction completing the grade 8 shrinks by about 11–18 percentage points. The lower pre-policy completion rates in rural areas play an important role in this finding because, as noted earlier, there is no evidence of a differential effect of the policy by urban and rural residence. In the completion rates of grades 9 to 11, there is no evidence for a changing urban–rural gap despite the lower starting values in rural areas because the negative coefficients of the rural interaction term in Table 6 counteract the low initial values in rural areas. Finally, there is some evidence for a narrowing urban–rural gap in the first three grade levels.

6.4 Analysis by Urban–Rural Residence for Women

Table 8 presents the estimation results on the policy effect by rural and urban residence for women. The key finding here is that the policy has a stronger effect on rural women in all grade levels from 6 to 11. There is strong evidence—statistically significant at the 1-percent

level—that the policy has a stronger effect on the completion of grades 6 to 8 in rural areas than in urban areas, unlike for the male sample where the rural-policy interaction terms are smaller in magnitude and statistically insignificant at the conventional levels. In grades 9 to 11, there is also evidence, in all models but A1, that the policy has a stronger impact in rural areas. This is quite different from the finding for men in Table 6, where the policy-rural interaction term has a negative (but statistically insignificant) coefficient.

Within the conceptual framework outlined in Section 3, a number of factors would contribute to the facts that the policy effect in grades 6 to 8 is stronger in rural areas than in urban areas and stronger for women as compared to men. First, with the substantial fall in schooling costs in grades 6 to 8 in rural areas, the improvement in school completion rates in rural areas vis-à-vis urban areas would be bigger for women than for men because the price elasticity of schooling demand is higher for women. Second, the sheepskin effects would be more important for urban men than for rural men whereas there would not be much difference in the sheepskin effects by rural and urban residence for women. Third, the selection effect would also favor rural women. Before the policy, the completion rate of grade 8 was roughly 80 percent for urban men, 60 percent for rural men, almost 70 percent for urban women, but just above 20 percent for rural women (Figure 7). Thus, the rural women who are treated by the policy constitute a much less-marginal group (with presumably higher average ability) than urban women whereas there is not as much of a difference in this sense between urban and rural men.

Despite the lower availability of high schools in rural areas, the policy has a stronger effect in grades 9 to 11 for rural women than for urban women. The fall in the cost of completing high school, resulting from the fall in the schooling costs of grades 6 to 8, is more important for rural women because the price elasticity of schooling demand is higher in rural areas. In addition, the policy induces a much larger share of rural women (29–42 percentage points) than of urban women (12–20 percentage points) to complete grade 8. Therefore, the pool of urban women who might be induced to further continue their education at the high school level constitutes a less-marginal group, with presumably higher average ability. In fact, as discussed earlier, there are a number of reasons for these women to change their decision on high school attendance. The additional three years of education could alleviate

the information problem—the lack of information about the returns on education—and the agency problem—the conflict of interest between children and parents—both of which are more likely to take place in rural areas. Moreover, since many of these women complete primary school under the bussing scheme or in a boarding school (both of which imply traveling long distances to school), there could be permanent changes in their and their parents' psychic costs of school attendance. As noted earlier, there is no difference in the effectiveness of the policy in high school grade levels between rural and urban men; however, we find such a difference between rural and urban women. This discrepancy is likely to result from the stronger sheepskin effects of high school completion for urban men than for rural men, which neutralizes the abovementioned factors that favor rural areas. Other factors—with the exception of psychic costs mentioned above—that cause a differential policy impact between urban and rural areas are likely to be similar for both men and women.

Table 9 presents the changes in the predicted grade-completion rates for urban women and rural women, as well as the changes in the predicted urban–rural gap by grade level. The completion rate of grade 8 increases by 12–20 percentage points in urban areas, and by a striking 29–41 percentage points in rural areas. Consequently, the urban–rural gap in the completion rate of grade 8 narrows by 16–30 percentage points. There is evidence of a closing urban–rural gap in the early high school years as well: the gap in the completion of grade 9 decreases by about 10 percentage points.

6.5 Analysis of Completed Years of Schooling

In this section, we examine the effect of the policy on the completed years of schooling at age 15 and at age 17 for urban men, urban women, rural men, and rural women separately. This is equivalent to cumulating the effects presented by grade level in the previous subsections to grade 8 and grade 10 levels.[28] We use the exact same methodology explained in Section 5; the only difference is the dependent variable. We use three models at age 15: 7-year intervals (maximum possible at this age) on both sides of the cutoff with linear splines and with quadratic splines, and 2-year intervals on both sides of the cutoff with no time trends.

[28] We use grade 10 rather than grade 11 because the small number of birth-cohorts that are affected by the policy at grade 11 do not yield estimates that are robust to specification checks. Further, in Tables 2 to 9, the estimates for grade 11 vary much more across various specifications than those for grades 9 and 10.

At age 17, we use two models: 5-year intervals (maximum possible at this age) on both sides of the cut-off with linear splines and 2-year intervals with no time trend. The predicted changes in the completed years of schooling that we uncover in this section depend obviously on the pre-policy levels of completed years of schooling. In other words, we cannot separately estimate the effectiveness of the policy and the effect on completed levels as we did in the previous subsections.

Table 10 presents the estimation results for completed years of schooling. In panel (a), the changes in the completed years of schooling at age 15 in urban areas are very similar for men and women, at around 0.4 to 0.5 years. From age 15 to age 17, this change increases by an additional 0.3 years for both men and women, and the total increase by age 17 reaches 0.7 to 0.8 years. The improvement in the completed years of schooling by age 17 is lower for women by about 0.07 to 0.08 years, but it is not statistically significant. The improvement in the completed years of schooling in rural areas, given in panel (b), is striking. There is already a substantial improvement by age 15, which is almost one year for men and more than one year for women. The completed years of schooling at age 17 increase roughly by about 1.3 to 1.4 years for men and by about 1.5 years for women with the policy. Comparing the changes in rural areas and urban areas by age, we see that for both men and women, the fraction of the improvement by age 15 in the total improvement by age 17 is much larger in rural areas than in urban areas.

In panel (c), the changes in the completed years of schooling are displayed for men in urban and rural areas. The improvement by age 15 for rural men, 0.8 to 0.9 years, is much higher than that for urban men, 0.3 to 0.5 years. By age 17, the improvement in the completed years of schooling further increases, but the gap between urban men and rural men in the improvement persists. While the completed years of schooling at age 17 increase by 0.8 to 0.9 years for urban men, the corresponding improvement for rural men is 1.3 years. Finally, in panel (d), we present the changes in the completed years of schooling for urban and rural women. There is a remarkable difference between urban and rural women in the improvement of the completed years of schooling at age 15, as well as at age 17. The improvement by age 15 is about 0.7 years higher for rural women. This narrowing of the urban–rural gap by age 15 for women is higher than that for men, given earlier in panel (c),

which is about 0.4 to 0.5 years. Finally, the narrowing of the urban–rural gap for women by age 17, at around 0.75 to 0.8 years, is only slightly higher than that by age 15.

7 Conclusion

The extension of compulsory schooling from 5 to 8 years with the 1997 education reform in Turkey—in the backdrop of significant disparities by gender and rural/urban residence—substantially increases the completion rates in both the new compulsory grade levels and in the post-compulsory grade levels for all subgroups by gender and rural/urban residence. Since compliance with compulsory schooling policies is far from perfect in Turkey, establishing that the policy indeed positively and significantly affects all subgroups is important. The completion rate for grade 8 of rural women (the most disadvantaged group) increases by about 30–40 percentage points with the policy. The more surprising finding is the favorable spillover effects of the policy on the post-compulsory schooling years. For instance, the high school completion rate of urban men increases by 10–18 percentage points. The resulting total effect on the completed years of schooling is impressive, particularly in rural areas. The completed years of schooling at age 17 increases by about 1.3 years for rural men, by about 1.5 years for rural women, and by about 0.8 years for both urban men and urban women.

The policy equalizes the educational attainment of urban and rural children substantially. The urban–rural gap in the completed years of schooling at age 17 falls by about 0.5 years for men and by about 0.7 to 0.8 years for women. In terms of grade levels, the urban–rural gap closes in all grade levels from 6 to 11 for women, whereas it closes only in grades 6 to 8 (not in post-compulsory grade levels) for men. Our analysis allows us to decompose these changes into a part that result from the effectiveness of the policy—measured by the policy effect on the odds of grade completion—and a part that stems from the lower pre-policy levels of grade completion. We find that the closing of the urban–rural gap for men results only from the lower pre-policy levels for rural men, whereas the closing of the gap for women results from both the lower pre-policy levels and the higher effectiveness of the policy for rural women in all grade levels from 6 to 11. That the policy has a stronger bite in rural areas for women but not for men could result from a number of factors. First, women would benefit more from the large reduction in schooling costs in rural areas because the price

elasticity of schooling demand is higher for them. Second, the sheepskin effects of schooling are more important for urban men than for rural men whereas there is not such a difference between urban and rural women due to the very low labor-market participation of urban women. Third, due to the greater pre-policy urban–rural schooling gap for women than for men, the difference between rural and urban residents who are treated by the policy in terms of ability and motivation for schooling would be higher for women than for men.

However, there is no evidence of a narrowing gender gap with the policy, in both urban and rural areas. On the contrary, the gender gap in post-compulsory schooling in urban areas widens despite improvements in both men and women. This results from the higher effectiveness of the policy for men in urban areas because the pre-policy grade-completion rates are also higher for men. Within a standard framework of schooling investment decisions, this finding can be explained only by the stronger sheepskin effects for men in urban areas resulting from the large gender differences in the labor-force participation rates in urban Turkey.

One of the most important findings of the study is the clear success of the policy in improving the schooling of rural women, the most disadvantaged group. If the real impediments to girls' schooling were cultural or social, increased availability and/or lower costs of schooling would not make a difference. However, in the Turkish case, we see that increased availability and lower costs of schooling make a huge difference in girls' schooling even in rural areas. Obviously, the starting levels are important here. In the low pre-policy post-compulsory school attendance environment of rural women in Turkey, the policy operates on a large pool of children. In another environment with high enrollment rates where drop-outs are only the marginal students, more targeted policies may be needed.

Another interesting finding is the strong spillover effects of the policy to post-compulsory schooling years. Such spillover effects are generally not reported in the previous literature; an exception is Oreopoulos (2009), although the magnitude of the spillovers is much smaller there. A unique feature of our study that leads to large spillover effects is the change in the sheepskin effects with the policy. The fall in the sheepskin effects for 5 and 8 years of schooling make completing high school much more attractive. In addition, since a large fraction of children are induced to finish the new compulsory schooling years and these children are

less-marginal students in terms of ability and motivation compared to their counterparts in developed countries, spillover effects resulting from other factors could be important as well. For instance, after being induced to finish three additional years of schooling, some children may improve their knowledge about the true returns to education or be more assertive when their parents' and their own goals do not overlap. There may be another channel that could contribute to the spillover effects for rural women. The policy instruments – transportation and boarding schools – could leave a permanent impact on psychic costs of schooling because both instruments imply attending schools in distant areas.

The improvements in educational outcomes for men and women, and urban and rural residents, but particularly for those who traditionally lag behind, have important implications for both individual and social welfare. There is a growing literature on the causal effects of education on various demographic and labor-market outcomes in developed-country settings. However, we know very little about such causal relationships in developing countries, where such relationships could significantly differ. For instance, longer schooling of mothers could change infant health through its effect on the probability of out-of-wedlock pregnancy in a Western setting, whereas such a channel may not exist in a socially conservative developing country. Thus, it will be important to establish such causal relationships in the Turkish context in future works, using the policy in this paper as a source of exogenous variation in schooling. This study lays the groundwork for future works regarding the causal effects of schooling by illustrating the groups whose schooling outcomes are altered the most.

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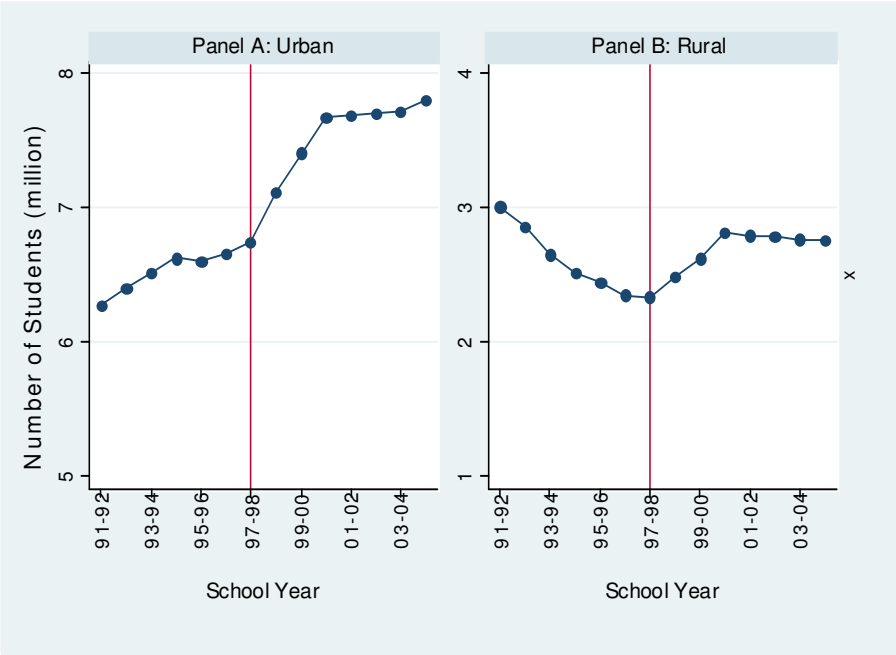
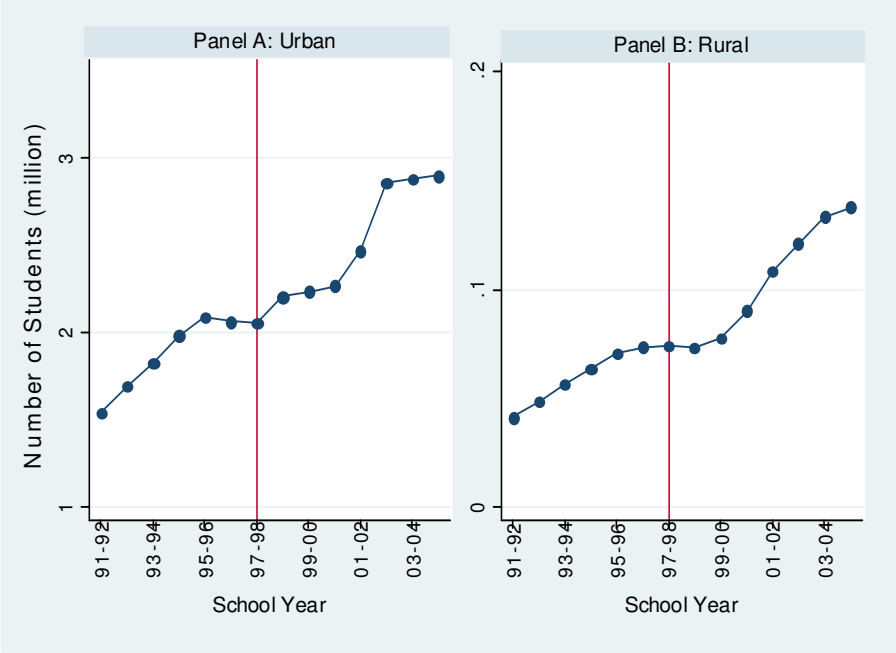
Figure 1 Number of Students in Basic Education (Grades 1-8) by Urban and Rural Residence



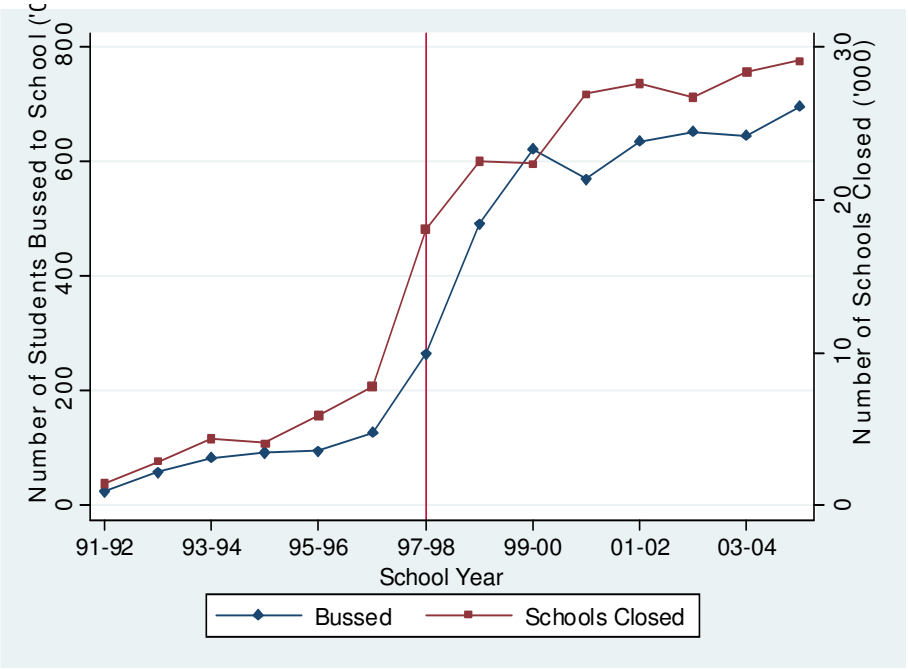
Source: Turkish Statistical Institute (1993-2006).

Figure 2 Number of Students in Upper Secondary Education (Grades 9-11) by Urban and Rural Residence



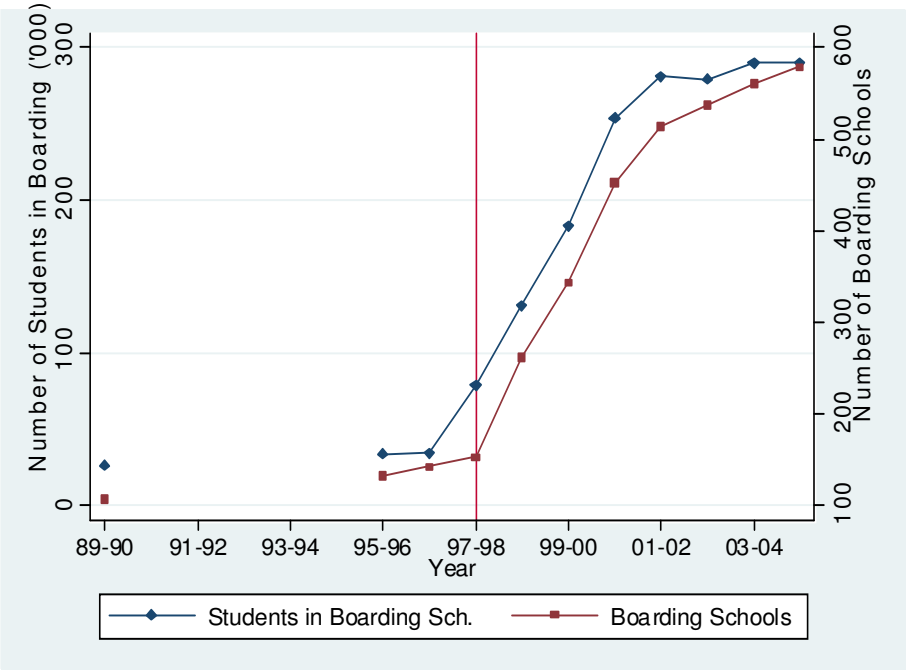
Source: Turkish Statistical Institute (1993-2006).

Figure 3 Number of Students Bussed to School and School Closures



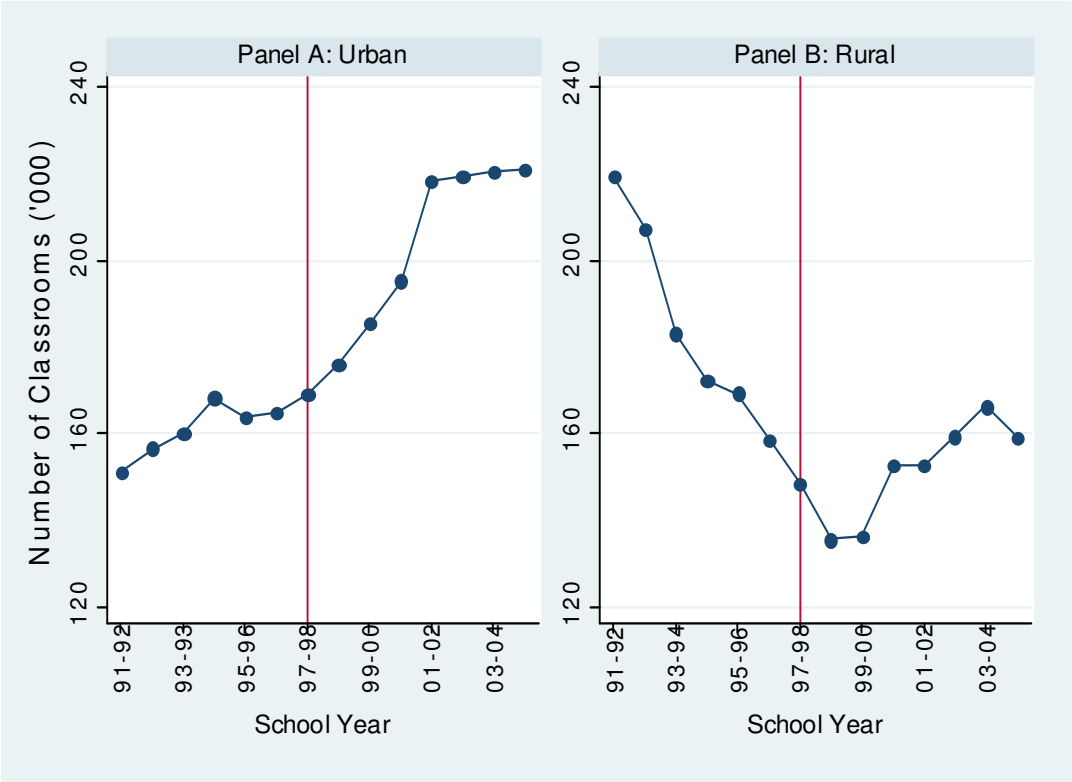
Source: Ministry of National Education (1989-2006)

Figure 4 Students in Boarding Schools



Source: Ministry of National Education (1989-2006).

Figure 5 Number of Classrooms in Basic Education Schools by Urban and Rural Residence



Source: Turkish Statistical Institute (1993-2006).

Figure 6 Fraction Completing Selected Grades by Gender and Rural/Urban Status

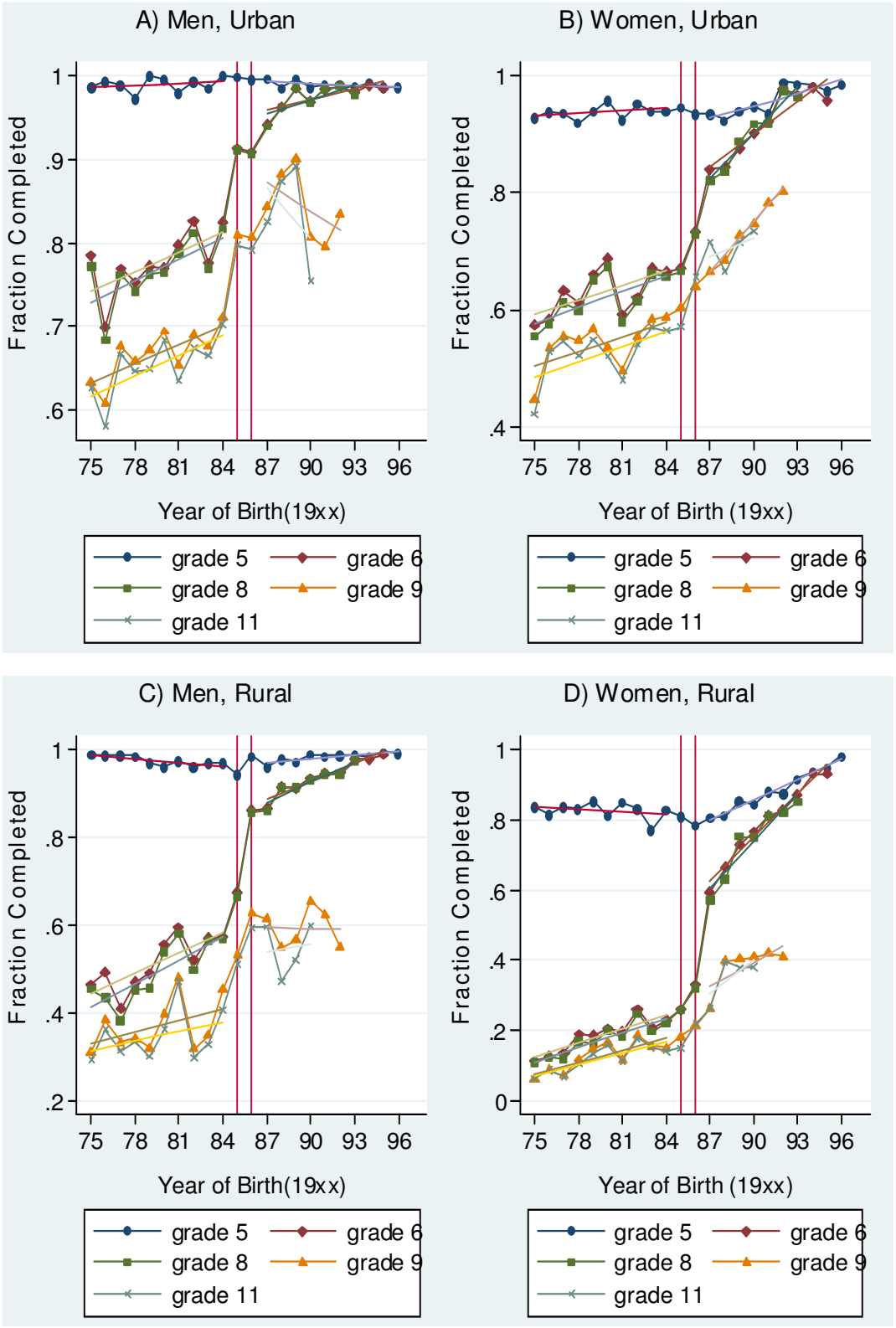


Table 1 Descriptive Statistics

	A) Male Sample		B) Female Sample	
	Mean	No. Obs.	Mean	No. Obs.
Geographical Region at Age 12				
West	0.323	7,860	0.350	14,851
South	0.114	7,860	0.129	14,851
Center	0.142	7,860	0.152	14,851
North	0.140	7,860	0.121	14,851
East	0.281	7,860	0.248	14,851
Type of Location at Age 12				
Large City (Urban)	0.401	7,855	0.431	14,844
Small City (Urban)	0.206	7,855	0.206	14,844
Village (Rural)	0.393	7,855	0.362	14,844

Notes: The female sample is based on 2003 and 2008 waves of TDHS, whereas the male sample is based on only 2008 wave of TDHS because information on the location of residence at age 12 is not available for men in the 2003 survey.

Table 2 Effect of the Education Policy by Gender in Urban Areas

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-84 and 1987-96 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Policy	0.215	-0.227	-0.201	-0.394	-0.199	1.528***	1.525***	1.500***	1.058***	1.154***	1.072***
	[0.749]	[0.898]	[0.907]	[0.842]	[0.836]	[0.250]	[0.250]	[0.251]	[0.215]	[0.286]	[0.307]
Policy * Female	-0.391	0.019	-0.089	0.015	-0.277	-0.756**	-0.840**	-0.794**	-0.805***	-0.764*	-0.625
	[0.633]	[0.751]	[0.758]	[0.768]	[0.779]	[0.341]	[0.364]	[0.331]	[0.242]	[0.402]	[0.424]
Composite Female	-0.176	-0.208	-0.290	-0.379**	-0.476**	0.772***	0.685***	0.706***	0.253**	0.390**	0.447***
	[0.173]	[0.189]	[0.181]	[0.191]	[0.186]	[0.129]	[0.139]	[0.120]	[0.107]	[0.169]	[0.167]
A2) QUADRATIC TIME TRENDS											
Policy	-1.299	-0.647	-0.604	-0.598	-0.876	1.313***	1.344***	1.282***	1.256***	1.007***	0.835***
	[2.273]	[2.488]	[2.500]	[2.417]	[2.402]	[0.346]	[0.329]	[0.319]	[0.333]	[0.261]	[0.259]
Policy * Female	1.099	0.515	0.461	0.634	0.830	-0.213	-0.235	-0.216	-0.836**	-0.324	-0.126
	[2.056]	[2.184]	[2.187]	[2.297]	[2.291]	[0.441]	[0.407]	[0.391]	[0.365]	[0.361]	[0.327]
Composite Female	-0.200	-0.132	-0.144	0.036	-0.047	1.100***	1.109***	1.066***	0.419*	0.683**	0.709***
	[0.327]	[0.393]	[0.371]	[0.294]	[0.321]	[0.236]	[0.213]	[0.211]	[0.244]	[0.273]	[0.257]
N	13,873	13,783	13,699	13,578	13,174	12,220	11,268	10,329	9,439	8,453	7,879

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-84 and 1987-1991 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	-0.931	-0.245	-0.204	-0.288	-0.283	1.473***	1.498***	1.476***	1.260***	1.269***	1.156***
	[1.515]	[1.756]	[1.767]	[1.711]	[1.707]	[0.319]	[0.307]	[0.297]	[0.314]	[0.345]	[0.365]
Policy * Female	0.862	0.256	0.168	0.391	0.361	-0.475	-0.584	-0.581	-1.160***	-1.021**	-0.838*
	[1.326]	[1.471]	[1.502]	[1.556]	[1.579]	[0.433]	[0.419]	[0.401]	[0.333]	[0.442]	[0.472]
Composite Female	-0.070	0.011	-0.036	0.103	0.078	0.998***	0.914***	0.895***	0.100	0.248*	0.318**
	[0.282]	[0.348]	[0.297]	[0.234]	[0.234]	[0.209]	[0.200]	[0.198]	[0.086]	[0.150]	[0.153]
N	7,874	7,835	7,790	7,730	7,657	7,310	6,917	6,556	6,197	5,734	5,180

C) 3-YEAR INTERVALS ON BOTH SIDES (1982-84 and 1987-89 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	-1.518	-0.837	-0.796	-1.694	-1.704	1.366***	1.398***	1.308***	0.792***	0.724***	0.628***
	[2.855]	[3.050]	[3.058]	[2.903]	[2.902]	[0.507]	[0.495]	[0.456]	[0.254]	[0.219]	[0.227]
Policy * Female	1.678	0.948	0.918	2.187	2.170	-0.590	-0.651	-0.630	-0.589**	-0.303	-0.152
	[2.518]	[2.696]	[2.655]	[2.662]	[2.691]	[0.622]	[0.597]	[0.555]	[0.299]	[0.334]	[0.347]
Composite Female	0.160	0.111	0.122	0.493*	0.466**	0.777***	0.746***	0.678***	0.204***	0.421***	0.476***
	[0.364]	[0.363]	[0.420]	[0.268]	[0.236]	[0.130]	[0.110]	[0.120]	[0.051]	[0.138]	[0.140]
N	4,669	4,649	4,621	4,586	4,556	4,520	4,460	4,124	3,798	3,423	3,367

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-84 and 1987-88 Birth Cohorts), NO TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.188	0.185	0.214	-0.044	-0.041	1.832***	1.855***	1.848***	1.185***	1.136***	1.109***
	[0.962]	[0.966]	[0.973]	[1.006]	[1.007]	[0.277]	[0.284]	[0.286]	[0.177]	[0.182]	[0.199]
Policy * Female	-0.126	-0.126	-0.186	0.018	-0.066	-0.735***	-0.791***	-0.813***	-0.773***	-0.610**	-0.566**
	[0.870]	[0.849]	[0.875]	[0.940]	[0.971]	[0.257]	[0.249]	[0.243]	[0.155]	[0.265]	[0.286]
Composite Female	0.061	0.059	0.028	-0.027	-0.107**	1.098***	1.064***	1.035***	0.411***	0.527***	0.543***
	[0.104]	[0.119]	[0.126]	[0.083]	[0.050]	[0.033]	[0.046]	[0.054]	[0.022]	[0.097]	[0.100]
N	3,098	3,085	3,071	3,045	3,025	3,005	2,971	2,947	2,638	2,292	2,255

Notes: A separate logit regression is run for each grade level. The dependent variable is grade completion status. "Composite female" coefficient is the sum of the "policy" and "policy*female" coefficients. Time trends are allowed to be different before and after the policy and by gender. Control variables also include dummies for 5 geographical regions, large city/small city, and gender. Standard errors are clustered at the level of year of birth. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 3 Effect of Policy on Grade Completion Rate by Gender in Urban Areas

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-1984 and 1987-1996 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Men	0.001	-0.001	-0.001	-0.003	-0.001	0.120***	0.124***	0.123***	0.154***	0.165***	0.159***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.022]	[0.022]	[0.021]	[0.027]	[0.031]	[0.035]
Women	-0.008	-0.009	-0.014*	-0.020**	-0.027***	0.131***	0.120***	0.124***	0.056**	0.085**	0.097***
	[0.008]	[0.008]	[0.008]	[0.010]	[0.010]	[0.022]	[0.023]	[0.021]	[0.024]	[0.037]	[0.036]
Men - Women	0.009*	0.008	0.013**	0.018**	0.026***	-0.012	0.004	-0.001	0.098***	0.08	0.062
	[0.005]	[0.006]	[0.005]	[0.009]	[0.009]	[0.038]	[0.040]	[0.037]	[0.035]	[0.058]	[0.062]
A2) QUADRATIC TIME TRENDS											
Men	-0.004	-0.002	-0.002	-0.002	-0.004	0.110**	0.118***	0.114***	0.196***	0.166***	0.143***
	[0.004]	[0.006]	[0.006]	[0.007]	[0.007]	[0.043]	[0.043]	[0.042]	[0.056]	[0.051]	[0.052]
Women	-0.009	-0.006	-0.007	0.002	-0.003	0.198***	0.201***	0.196***	0.094*	0.150**	0.156***
	[0.014]	[0.017]	[0.017]	[0.017]	[0.020]	[0.047]	[0.045]	[0.045]	[0.057]	[0.063]	[0.060]
Men - Women	0.005	0.004	0.005	-0.004	-0.001	-0.088	-0.083	-0.082	0.103	0.016	-0.013
	[0.012]	[0.013]	[0.012]	[0.015]	[0.018]	[0.067]	[0.065]	[0.064]	[0.067]	[0.077]	[0.072]
N	13,873	13,783	13,699	13,578	13,174	12,220	11,268	10,329	9,439	8,453	7,879

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-1984 and 1987-1991 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	-0.003	-0.001	-0.001	-0.001	-0.001	0.124***	0.130***	0.128***	0.186***	0.188***	0.176***
	[0.004]	[0.007]	[0.007]	[0.008]	[0.008]	[0.040]	[0.039]	[0.037]	[0.046]	[0.049]	[0.052]
Women	-0.003	0.001	-0.002	0.006	0.005	0.171***	0.160***	0.159***	0.022	0.053*	0.068**
	[0.013]	[0.017]	[0.015]	[0.014]	[0.015]	[0.041]	[0.040]	[0.040]	[0.019]	[0.032]	[0.033]
Men - Women	0.000	-0.002	0.001	-0.007	-0.006	-0.047	-0.030	-0.031	0.164***	0.135**	0.108
	[0.011]	[0.011]	[0.009]	[0.010]	[0.012]	[0.066]	[0.064]	[0.062]	[0.050]	[0.068]	[0.073]
N	7,874	7,835	7,790	7,730	7,657	7,310	6,917	6,556	6,197	5,734	5,180

C) 3-YEAR INTERVALS ON BOTH SIDES (1982-1984 and 1987-1989 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	-0.004	-0.003	-0.003	-0.005	-0.005	0.123*	0.131*	0.120**	0.120***	0.111***	0.097**
	[0.005]	[0.008]	[0.008]	[0.006]	[0.006]	[0.066]	[0.068]	[0.060]	[0.046]	[0.039]	[0.039]
Women	0.010	0.007	0.008	0.031	0.032*	0.122***	0.120***	0.113***	0.044***	0.090***	0.103***
	[0.021]	[0.019]	[0.025]	[0.020]	[0.018]	[0.024]	[0.021]	[0.022]	[0.011]	[0.029]	[0.030]
Men - Women	-0.014	-0.010	-0.011	-0.037**	-0.037**	0.001	0.011	0.007	0.076	0.021	-0.006
	[0.017]	[0.012]	[0.018]	[0.016]	[0.015]	[0.090]	[0.088]	[0.081]	[0.056]	[0.063]	[0.065]
N	4,075	4,057	4,033	4,586	4,556	4,520	4,460	4,124	3,798	3,423	3,367

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-1984 and 1987-1988 Birth Cohorts) NO TIME TREND											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	0.002	0.001	0.002	0.000	0.000	0.160***	0.165***	0.165***	0.183***	0.179***	0.178***
	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]	[0.028]	[0.028]	[0.028]	[0.026]	[0.026]	[0.029]
Women	0.004	0.004	0.002	-0.001	-0.006**	0.180***	0.178***	0.175***	0.090***	0.115***	0.119***
	[0.005]	[0.006]	[0.007]	[0.004]	[0.003]	[0.003]	[0.005]	[0.007]	[0.005]	[0.020]	[0.020]
Men - Women	-0.002	-0.002	-0.001	0.001	0.006	-0.019	-0.012	-0.010	0.093***	0.064	0.059
	[0.004]	[0.002]	[0.004]	[0.005]	[0.006]	[0.029]	[0.028]	[0.027]	[0.023]	[0.042]	[0.046]
N	2,708	2,697	2,685	3,045	3,025	3,005	2,971	2,947	2,638	2,292	2,255

Notes: The predicted values are based on the estimates in Table 2. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 4 Effect of the Education Policy by Gender in Rural Areas

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-84 and 1987-96 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Policy	1.112***	1.049***	1.069***	0.718***	0.693***	1.467***	1.484***	1.481***	0.611**	0.556**	0.545*
	[0.285]	[0.247]	[0.250]	[0.222]	[0.233]	[0.139]	[0.154]	[0.161]	[0.242]	[0.263]	[0.298]
Policy * Female	-1.087***	-1.116***	-1.182***	-0.928***	-0.888**	-0.141	-0.182	-0.215	-0.305	-0.047	-0.150
	[0.324]	[0.301]	[0.316]	[0.339]	[0.351]	[0.197]	[0.221]	[0.228]	[0.423]	[0.433]	[0.527]
Composite Female	0.026	-0.067	-0.112	-0.210	-0.195	1.326***	1.302***	1.265***	0.307	0.509**	0.395
	[0.191]	[0.160]	[0.169]	[0.195]	[0.183]	[0.155]	[0.140]	[0.144]	[0.244]	[0.220]	[0.273]
A2) QUADRATIC TIME TRENDS											
Policy	-0.198	-0.060	-0.028	-0.531	-0.605	1.642***	1.535***	1.525***	0.554	0.650	0.903**
	[0.607]	[0.482]	[0.482]	[0.412]	[0.425]	[0.260]	[0.289]	[0.296]	[0.452]	[0.435]	[0.375]
Policy * Female	0.514	0.444	0.515	1.071*	1.242*	0.454	0.394	0.298	0.754	0.766	0.334
	[0.842]	[0.713]	[0.693]	[0.649]	[0.656]	[0.327]	[0.351]	[0.339]	[0.574]	[0.552]	[0.551]
Composite Female	0.316	0.384	0.487	0.540	0.637	2.096***	1.930***	1.823***	1.307***	1.416***	1.237***
	[0.440]	[0.395]	[0.378]	[0.435]	[0.399]	[0.168]	[0.197]	[0.189]	[0.260]	[0.250]	[0.258]
N	8,808	8,743	8,645	8,511	8,264	7,686	7,171	6,712	6,196	5,672	5,372

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-84 and 1987-1991 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.419	0.388	0.400	-0.032	-0.088	1.963***	1.933***	1.914***	0.787**	0.819**	0.872**
	[0.302]	[0.302]	[0.307]	[0.196]	[0.210]	[0.149]	[0.169]	[0.174]	[0.389]	[0.385]	[0.385]
Policy * Female	-0.418	-0.351	-0.284	0.150	0.291	-0.229	-0.288	-0.269	0.007	0.216	0.061
	[0.398]	[0.417]	[0.415]	[0.372]	[0.355]	[0.177]	[0.217]	[0.234]	[0.547]	[0.541]	[0.635]
Composite Female	0.001	0.037	0.116	0.118	0.203	1.734***	1.645***	1.645***	0.794***	1.035***	0.933***
	[0.290]	[0.255]	[0.259]	[0.315]	[0.274]	[0.120]	[0.135]	[0.133]	[0.218]	[0.213]	[0.269]
N	4,856	4,824	4,770	4,704	4,637	4,413	4,237	4,055	3,822	3,561	3,267

C) 4-YEAR INTERVALS ON BOTH SIDES (1981-84 and 1988-91 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.804**	0.833***	0.847***	0.259	0.216	2.071***	1.991***	1.989***	0.862	0.898	1.080*
	[0.341]	[0.257]	[0.264]	[0.215]	[0.220]	[0.228]	[0.262]	[0.265]	[0.608]	[0.614]	[0.593]
Policy * Female	-0.689*	-0.665*	-0.540	0.123	0.173	-0.360	-0.454	-0.471	-0.405	-0.209	-0.438
	[0.379]	[0.376]	[0.394]	[0.392]	[0.338]	[0.310]	[0.376]	[0.373]	[0.892]	[0.892]	[0.946]
Composite Female	0.115	0.167	0.307	0.382	0.389	1.711***	1.537***	1.518***	0.457	0.689**	0.642*
	[0.397]	[0.351]	[0.352]	[0.432]	[0.376]	[0.161]	[0.177]	[0.162]	[0.292]	[0.286]	[0.359]
N	3,870	3,844	3,803	3,755	3,716	3,643	3,476	3,297	3,076	2,845	2,795

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-84 and 1987-88 Birth Cohorts), NO TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.556***	0.571***	0.577***	0.143	0.112	2.109***	2.102***	2.124***	0.743***	0.699***	0.697***
	[0.121]	[0.117]	[0.123]	[0.212]	[0.231]	[0.279]	[0.295]	[0.313]	[0.216]	[0.217]	[0.229]
Policy * Female	-0.335	-0.359	-0.323	0.025	0.020	0.000	-0.028	-0.091	0.158	0.433	0.389
	[0.232]	[0.233]	[0.244]	[0.242]	[0.241]	[0.063]	[0.082]	[0.102]	[0.402]	[0.361]	[0.470]
Composite Female	0.221	0.212	0.253*	0.169	0.133	2.109***	2.074***	2.033***	0.901***	1.132***	1.086***
	[0.179]	[0.144]	[0.144]	[0.170]	[0.135]	[0.252]	[0.249]	[0.246]	[0.223]	[0.170]	[0.252]
N	1,957	1,942	1,922	1,892	1,876	1,846	1,836	1,815	1,617	1,423	1,403

Notes: A separate logit regression is run for each grade level. The dependent variable is grade completion status. "Composite female" coefficient is the sum of the "policy" and "policy*female" coefficients. Time trends are allowed to be different before and after the policy and by gender. Control variables also include dummies for 5 geographical regions, large city/small city, and gender. Standard errors are clustered at the level of year of birth. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 5 Effect of Policy on Grade Completion Rate by Gender in Rural Areas

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-1984 and 1987-1996 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Men	0.032***	0.032***	0.033***	0.026***	0.025***	0.235***	0.236***	0.237***	0.145**	0.132**	0.129*
	[0.010]	[0.008]	[0.008]	[0.009]	[0.009]	[0.024]	[0.027]	[0.028]	[0.057]	[0.062]	[0.070]
Women	0.003	-0.007	-0.011	-0.023	-0.022	0.293***	0.287***	0.279***	0.058	0.099**	0.074
	[0.019]	[0.016]	[0.017]	[0.021]	[0.021]	[0.030]	[0.026]	[0.028]	[0.045]	[0.041]	[0.051]
Men - Women	0.029	0.039**	0.044**	0.049*	0.047*	-0.058	-0.050	-0.042	0.087	0.033	0.055
	[0.020]	[0.018]	[0.020]	[0.025]	[0.026]	[0.039]	[0.044]	[0.044]	[0.089]	[0.093]	[0.113]
A2) QUADRATIC TIME TRENDS											
Men	-0.004	-0.001	-0.001	-0.013	-0.014*	0.262***	0.245***	0.244***	0.131	0.154	0.212**
	[0.010]	[0.009]	[0.009]	[0.008]	[0.008]	[0.050]	[0.058]	[0.059]	[0.106]	[0.101]	[0.084]
Women	0.031	0.040	0.052	0.064	0.079	0.426***	0.397***	0.373***	0.178***	0.210***	0.171***
	[0.046]	[0.044]	[0.044]	[0.055]	[0.052]	[0.023]	[0.029]	[0.028]	[0.024]	[0.025]	[0.024]
Men - Women	-0.034	-0.041	-0.053	-0.076	-0.093*	-0.164***	-0.153**	-0.129**	-0.047	-0.056	0.041
	[0.049]	[0.047]	[0.047]	[0.057]	[0.055]	[0.061]	[0.067]	[0.064]	[0.116]	[0.111]	[0.099]
N	8,808	8,743	8,645	8,511	8,264	7,686	7,171	6,712	6,196	5,672	5,372

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-1984 and 1987-1991 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	0.011	0.010	0.010	-0.001	-0.003	0.323***	0.319***	0.318***	0.183**	0.189**	0.199**
	[0.008]	[0.008]	[0.008]	[0.006]	[0.006]	[0.020]	[0.024]	[0.025]	[0.088]	[0.085]	[0.085]
Women	0.000	0.004	0.012	0.013	0.024	0.357***	0.338***	0.335***	0.129***	0.175***	0.151***
	[0.028]	[0.026]	[0.028]	[0.037]	[0.033]	[0.016]	[0.019]	[0.019]	[0.033]	[0.033]	[0.044]
Men - Women	0.010	0.006	-0.002	-0.014	-0.027	-0.034	-0.019	-0.018	0.054	0.013	0.047
	[0.029]	[0.028]	[0.030]	[0.037]	[0.034]	[0.033]	[0.040]	[0.042]	[0.111]	[0.109]	[0.125]
N	4,856	4,824	4,770	4,704	4,637	4,413	4,237	4,055	3,822	3,561	3,267

C) 4-YEAR INTERVALS ON BOTH SIDES (1981-1984 and 1987-1990 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	0.022*	0.023***	0.024***	0.009	0.008	0.340***	0.325***	0.328***	0.200	0.206	0.242**
	[0.011]	[0.008]	[0.008]	[0.008]	[0.008]	[0.036]	[0.045]	[0.045]	[0.135]	[0.133]	[0.122]
Women	0.011	0.017	0.032	0.044	0.047	0.352***	0.318***	0.312***	0.080*	0.125***	0.113*
	[0.039]	[0.036]	[0.039]	[0.053]	[0.047]	[0.025]	[0.029]	[0.026]	[0.047]	[0.046]	[0.059]
Men - Women	0.011	0.006	-0.009	-0.035	-0.039	-0.012	0.007	0.016	0.121	0.081	0.130
	[0.035]	[0.035]	[0.038]	[0.050]	[0.044]	[0.059]	[0.073]	[0.071]	[0.180]	[0.177]	[0.179]
N	3,870	3,844	3,803	3,755	3,716	3,643	3,476	3,297	3,076	2,845	2,795

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-1984 and 1987-1988 Birth Cohorts) NO TIME TREND											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Men	0.012***	0.013***	0.013***	0.004	0.003	0.325***	0.325***	0.327***	0.173***	0.163***	0.162***
	[0.003]	[0.003]	[0.003]	[0.006]	[0.006]	[0.017]	[0.018]	[0.019]	[0.050]	[0.052]	[0.056]
Women	0.021	0.021	0.026*	0.018	0.015	0.417***	0.408***	0.395***	0.148***	0.194***	0.182***
	[0.018]	[0.015]	[0.015]	[0.019]	[0.015]	[0.030]	[0.028]	[0.027]	[0.043]	[0.034]	[0.050]
Men - Women	-0.009	-0.008	-0.013	-0.014	-0.012	-0.092***	-0.083***	-0.068***	0.026	-0.031	-0.020
	[0.019]	[0.017]	[0.018]	[0.019]	[0.015]	[0.016]	[0.015]	[0.014]	[0.085]	[0.080]	[0.103]
N	1,957	1,942	1,922	1,892	1,876	1,846	1,836	1,815	1,617	1,423	1,403

Notes: The predicted values are based on the estimates in Table 4. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 6 Effect of the Education Policy by Rural/Urban Status for Men

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-84 and 1987-96 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Policy	0.266	-0.151	-0.128	-0.296	-0.112	1.534***	1.531***	1.510***	1.069***	1.166***	1.094***
	[0.733]	[0.880]	[0.886]	[0.823]	[0.816]	[0.244]	[0.243]	[0.245]	[0.212]	[0.283]	[0.309]
Policy * Rural	0.842	1.182	1.174	0.983	0.782	-0.136	-0.116	-0.083	-0.450	-0.600	-0.556
	[0.780]	[0.917]	[0.923]	[0.883]	[0.875]	[0.296]	[0.280]	[0.279]	[0.354]	[0.456]	[0.545]
Composite Rural	1.108***	1.032***	1.046***	0.687***	0.670***	1.398***	1.415***	1.428***	0.619***	0.566**	0.538*
	[0.289]	[0.248]	[0.249]	[0.232]	[0.242]	[0.128]	[0.142]	[0.151]	[0.232]	[0.253]	[0.292]
A2) QUADRATIC TIME TRENDS											
Policy	-1.407	-0.712	-0.672	-0.671	-0.957	1.203***	1.245***	1.194***	1.214***	0.962***	0.793***
	[2.213]	[2.485]	[2.497]	[2.413]	[2.389]	[0.297]	[0.285]	[0.277]	[0.317]	[0.235]	[0.233]
Policy * Rural	1.150	0.593	0.578	0.075	0.299	0.346	0.198	0.240	-0.663	-0.317	0.090
	[2.491]	[2.749]	[2.756]	[2.676]	[2.656]	[0.388]	[0.393]	[0.396]	[0.495]	[0.388]	[0.307]
Composite Rural	-0.258	-0.119	-0.093	-0.597	-0.658	1.550***	1.442***	1.434***	0.551	0.645	0.883**
	[0.553]	[0.446]	[0.446]	[0.393]	[0.401]	[0.240]	[0.265]	[0.274]	[0.430]	[0.417]	[0.360]
N	7,847	7,784	7,722	7,654	7,563	7,047	6,495	6,013	5,531	4,965	4,493

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-84 and 1987-1991 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	-0.787	-0.116	-0.090	-0.129	-0.126	1.435***	1.466***	1.455***	1.254***	1.265***	1.164***
	[1.563]	[1.834]	[1.843]	[1.784]	[1.784]	[0.290]	[0.281]	[0.275]	[0.302]	[0.333]	[0.359]
Policy * Rural	1.183	0.478	0.462	0.054	0.002	0.344	0.278	0.288	-0.488	-0.464	-0.328
	[1.658]	[1.960]	[1.968]	[1.929]	[1.937]	[0.285]	[0.290]	[0.279]	[0.461]	[0.510]	[0.590]
Composite Rural	0.396	0.362	0.372	-0.075	-0.124	1.779***	1.744***	1.743***	0.766**	0.802**	0.836**
	[0.279]	[0.283]	[0.287]	[0.184]	[0.198]	[0.117]	[0.134]	[0.136]	[0.379]	[0.382]	[0.385]
N	4,000	3,980	3,953	3,920	3,893	3,850	3,788	3,751	3,673	3,508	3,057

C) 4-YEAR INTERVALS ON BOTH SIDES (1981-84 and 1987-90 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	-1.499	-1.730	-1.692	-1.723	-1.706	1.561***	1.572***	1.547***	0.992***	0.906***	0.923***
	[2.084]	[2.291]	[2.302]	[2.150]	[2.145]	[0.359]	[0.346]	[0.339]	[0.279]	[0.279]	[0.329]
Policy * Rural	2.260	2.514	2.489	1.928	1.871	0.281	0.189	0.234	-0.170	-0.040	0.108
	[2.097]	[2.290]	[2.297]	[2.152]	[2.145]	[0.336]	[0.356]	[0.338]	[0.665]	[0.717]	[0.726]
Composite Rural	0.761**	0.784***	0.797***	0.205	0.165	1.842***	1.761***	1.781***	0.822	0.866	1.031*
	[0.333]	[0.255]	[0.262]	[0.218]	[0.222]	[0.188]	[0.216]	[0.219]	[0.603]	[0.616]	[0.600]
N	3,214	3,196	3,173	3,148	3,129	3,097	3,045	3,019	2,961	2,846	2,748

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-84 and 1987-88 Birth Cohorts), NO TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.218	0.213	0.231	-0.008	-0.019	1.754***	1.773***	1.772***	1.133***	1.099***	1.070***
	[0.961]	[0.964]	[0.970]	[1.017]	[1.021]	[0.273]	[0.279]	[0.277]	[0.170]	[0.170]	[0.182]
Policy * Rural	0.335	0.353	0.340	0.152	0.132	0.176	0.135	0.147	-0.412	-0.408	-0.385
	[0.967]	[0.968]	[0.971]	[1.155]	[1.170]	[0.184]	[0.176]	[0.174]	[0.270]	[0.308]	[0.358]
Composite Rural	0.553***	0.566***	0.571***	0.144	0.113	1.930***	1.908***	1.919***	0.721***	0.691***	0.685***
	[0.121]	[0.119]	[0.125]	[0.197]	[0.217]	[0.207]	[0.216]	[0.220]	[0.203]	[0.217]	[0.235]
N	1,576	1,570	1,559	1,543	1,531	1,515	1,494	1,485	1,461	1,412	1,379

Notes: A separate logit regression is run for each grade level. The dependent variable is grade completion status. "Composite female" coefficient is the sum of the "policy" and "policy*female" coefficients. Time trends are allowed to be different before and after the policy and by gender. Control variables also include dummies for 5 geographical regions, large city/small city, and gender. Standard errors are clustered at the level of year of birth. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 7 Effect of Policy on Grade Completion Rate by Rural/Urban Status for Men

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-1984 and 1987-1996 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Urban	0.002	-0.001	-0.001	-0.002	-0.001	0.126***	0.129***	0.129***	0.160***	0.171***	0.166***
	[0.005]	[0.005]	[0.005]	[0.006]	[0.005]	[0.022]	[0.022]	[0.022]	[0.026]	[0.031]	[0.035]
Rural	0.033***	0.032***	0.033***	0.026**	0.026**	0.238***	0.240***	0.242***	0.148***	0.136**	0.128*
	[0.012]	[0.010]	[0.010]	[0.011]	[0.011]	[0.025]	[0.028]	[0.029]	[0.055]	[0.060]	[0.069]
Urban-Rural	-0.031***	-0.033***	-0.034***	-0.029**	-0.026**	-0.113***	-0.111***	-0.113***	0.012	0.035	0.038
	[0.012]	[0.011]	[0.012]	[0.013]	[0.012]	[0.039]	[0.039]	[0.039]	[0.065]	[0.077]	[0.095]
A2) QUADRATIC TIME TRENDS											
Urban	-0.004	-0.002	-0.002	-0.002	-0.004	0.101***	0.109***	0.106***	0.191***	0.160***	0.138***
	[0.004]	[0.006]	[0.006]	[0.007]	[0.007]	[0.037]	[0.037]	[0.036]	[0.052]	[0.046]	[0.047]
Rural	-0.005	-0.002	-0.002	-0.015*	-0.016**	0.262***	0.243***	0.242***	0.132	0.154	0.209***
	[0.009]	[0.008]	[0.008]	[0.008]	[0.008]	[0.049]	[0.056]	[0.058]	[0.102]	[0.098]	[0.081]
Urban-Rural	0.000	0.000	-0.001	0.012	0.012	-0.161**	-0.134*	-0.137*	0.059	0.006	-0.072
	[0.011]	[0.012]	[0.012]	[0.013]	[0.014]	[0.064]	[0.070]	[0.070]	[0.096]	[0.086]	[0.069]
N	7,847	7,784	7,722	7,654	7,563	7,047	6,495	6,013	5,531	4,965	4,493

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-1984 and 1987-1991 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	-0.003	-0.001	0.000	-0.001	-0.001	0.124***	0.131***	0.129***	0.188***	0.191***	0.180***
	[0.004]	[0.008]	[0.008]	[0.009]	[0.009]	[0.036]	[0.036]	[0.034]	[0.043]	[0.046]	[0.050]
Rural	0.010	0.009	0.009	-0.002	-0.004	0.314***	0.309***	0.309***	0.182**	0.189**	0.194**
	[0.006]	[0.006]	[0.007]	[0.006]	[0.006]	[0.024]	[0.026]	[0.027]	[0.087]	[0.086]	[0.086]
Urban-Rural	-0.013	-0.009	-0.009	0.002	0.003	-0.190***	-0.178***	-0.180***	0.006	0.002	-0.015
	[0.008]	[0.012]	[0.013]	[0.014]	[0.015]	[0.043]	[0.046]	[0.044]	[0.084]	[0.091]	[0.104]
N	4,000	3,980	3,953	3,920	3,893	3,850	3,788	3,751	3,673	3,508	3,057

C) 4-YEAR INTERVALS ON BOTH SIDES (1981-1984 and 1987-1990 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	-0.004	-0.005	-0.005	-0.006	-0.005	0.140***	0.144***	0.140***	0.141***	0.129***	0.132***
	[0.004]	[0.004]	[0.004]	[0.005]	[0.005]	[0.048]	[0.046]	[0.044]	[0.033]	[0.032]	[0.037]
Rural	0.022**	0.024***	0.025***	0.008	0.007	0.333***	0.317***	0.322***	0.194	0.202	0.235*
	[0.010]	[0.006]	[0.007]	[0.008]	[0.009]	[0.039]	[0.045]	[0.046]	[0.135]	[0.134]	[0.125]
Urban-Rural	-0.026***	-0.029***	-0.029***	-0.014	-0.012	-0.193***	-0.173***	-0.182***	-0.054	-0.073	-0.103
	[0.010]	[0.006]	[0.006]	[0.011]	[0.011]	[0.052]	[0.059]	[0.056]	[0.134]	[0.141]	[0.132]
N	2,711	2,695	2,674	2,651	2,632	3,097	3,045	3,019	2,961	2,846	2,748

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-1984 and 1987-1988 Birth Cohorts) NO TIME TREND											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	0.000	0.000	0.000	-0.002	-0.002	0.156***	0.162***	0.162***	0.173***	0.170***	0.170***
	[0.006]	[0.006]	[0.006]	[0.007]	[0.007]	[0.023]	[0.021]	[0.021]	[0.021]	[0.022]	[0.024]
Rural	0.011**	0.011**	0.011**	0.002	0.001	0.314***	0.314***	0.317***	0.169***	0.161***	0.158***
	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]	[0.019]	[0.021]	[0.021]	[0.049]	[0.054]	[0.060]
Urban-Rural	-0.011	-0.011*	-0.011	-0.004	-0.003	-0.158***	-0.153***	-0.155***	0.004	0.009	0.011
	[0.007]	[0.007]	[0.007]	[0.012]	[0.012]	[0.027]	[0.026]	[0.026]	[0.052]	[0.062]	[0.072]
N	1,576	1,570	1,559	1,543	1,531	1,515	1,494	1,485	1,461	1,412	1,379

Notes: The predicted values are based on the estimates in Table 6. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 8 Effect of the Education Policy by Rural/Urban Status for Women

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-84 and 1987-96 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Policy	-0.183	-0.214	-0.299*	-0.388**	-0.492***	0.804***	0.712***	0.731***	0.258**	0.391**	0.449***
	[0.173]	[0.188]	[0.182]	[0.193]	[0.191]	[0.129]	[0.138]	[0.118]	[0.107]	[0.168]	[0.165]
Policy * Rural	0.214	0.155	0.196	0.192	0.314	0.568***	0.633***	0.575***	0.061	0.112	-0.070
	[0.205]	[0.194]	[0.177]	[0.234]	[0.224]	[0.203]	[0.187]	[0.186]	[0.265]	[0.309]	[0.370]
Composite Rural	0.031	-0.059	-0.102	-0.196	-0.178	1.372***	1.346***	1.307***	0.320	0.503**	0.379
	[0.188]	[0.158]	[0.166]	[0.191]	[0.178]	[0.156]	[0.140]	[0.146]	[0.257]	[0.233]	[0.288]
A2) QUADRATIC TIME TRENDS											
Policy	-0.183	-0.117	-0.128	0.056	-0.025	1.146***	1.155***	1.107***	0.431*	0.689**	0.713***
	[0.329]	[0.394]	[0.373]	[0.291]	[0.321]	[0.234]	[0.210]	[0.208]	[0.244]	[0.274]	[0.258]
Policy * Rural	0.506	0.501	0.603	0.469	0.640	1.013***	0.833***	0.769***	0.892***	0.732**	0.527
	[0.433]	[0.437]	[0.376]	[0.540]	[0.547]	[0.271]	[0.236]	[0.228]	[0.286]	[0.348]	[0.350]
Composite Rural	0.323	0.384	0.475	0.526	0.615	2.160***	1.988***	1.876***	1.322***	1.422***	1.240***
	[0.432]	[0.387]	[0.366]	[0.419]	[0.380]	[0.155]	[0.188]	[0.183]	[0.257]	[0.256]	[0.271]
N	14,834	14,742	14,622	14,435	13,875	12,859	11,944	11,028	10,104	9,160	8,758

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-84 and 1987-1991 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	-0.081	0.004	-0.043	0.104	0.081	1.042***	0.955***	0.933***	0.103	0.250*	0.318**
	[0.281]	[0.349]	[0.297]	[0.231]	[0.229]	[0.211]	[0.202]	[0.200]	[0.085]	[0.149]	[0.153]
Policy * Rural	0.087	0.037	0.157	0.011	0.115	0.737***	0.728***	0.743***	0.705***	0.794***	0.609*
	[0.304]	[0.340]	[0.281]	[0.390]	[0.369]	[0.238]	[0.183]	[0.178]	[0.192]	[0.277]	[0.343]
Composite Rural	0.007	0.041	0.114	0.115	0.196	1.778***	1.683***	1.676***	0.807***	1.043***	0.927***
	[0.285]	[0.251]	[0.254]	[0.306]	[0.265]	[0.113]	[0.127]	[0.122]	[0.228]	[0.228]	[0.293]
N	8,730	8,679	8,607	8,514	8,401	7,873	7,366	6,860	6,346	5,787	5,390

C) 3-YEAR INTERVALS ON BOTH SIDES (1981-84 and 1987-90 Birth Cohorts), LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.172	0.132	0.138	0.494*	0.469**	0.812***	0.788***	0.718***	0.206***	0.423***	0.479***
	[0.364]	[0.365]	[0.429]	[0.272]	[0.235]	[0.135]	[0.116]	[0.126]	[0.049]	[0.136]	[0.140]
Policy * Rural	-0.592***	-0.430***	-0.230***	-0.571***	-0.475***	1.444***	1.382***	1.351***	0.976***	0.976***	0.877***
	[0.098]	[0.056]	[0.081]	[0.206]	[0.169]	[0.313]	[0.284]	[0.288]	[0.124]	[0.256]	[0.302]
Composite Rural	-0.420	-0.298	-0.092	-0.077	-0.006	2.256***	2.170***	2.069***	1.183***	1.399***	1.356***
	[0.314]	[0.320]	[0.355]	[0.438]	[0.377]	[0.194]	[0.185]	[0.191]	[0.081]	[0.130]	[0.187]
N	5,158	5,129	5,088	5,036	4,998	4,943	4,894	4,398	3,901	3,394	3,363

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-84 and 1987-88 Birth Cohorts), NO TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Policy	0.074	0.070	0.038	-0.031	-0.115**	1.143***	1.111***	1.082***	0.418***	0.532***	0.549***
	[0.100]	[0.115]	[0.127]	[0.081]	[0.045]	[0.049]	[0.064]	[0.073]	[0.025]	[0.092]	[0.096]
Policy * Rural	0.146	0.140***	0.209***	0.196	0.250*	1.002***	0.997***	0.975***	0.510**	0.636**	0.562
	[0.094]	[0.049]	[0.012]	[0.183]	[0.144]	[0.157]	[0.130]	[0.112]	[0.216]	[0.291]	[0.385]
Composite Rural	0.220	0.211	0.247*	0.165	0.136	2.144***	2.108***	2.057***	0.928***	1.168***	1.111***
	[0.173]	[0.140]	[0.138]	[0.160]	[0.128]	[0.194]	[0.188]	[0.181]	[0.235]	[0.200]	[0.292]
N	3,479	3,457	3,434	3,394	3,370	3,336	3,313	3,277	2,794	2,303	2,279

Notes: A separate logit regression is run for each grade level. The dependent variable is grade completion status. "Composite female" coefficient is the sum of the "policy" and "policy*female" coefficients. Time trends are allowed to be different before and after the policy and by gender. Control variables also include dummies for 5 geographical regions, large city/small city, and gender. Standard errors are clustered at the level of year of birth. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 9 Effect of Policy on Grade Completion Rate by Rural/Urban Status for Women

A) 10-YEAR INTERVALS ON BOTH SIDES (1975-1984 and 1987-1996 Birth Cohorts)											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
A1) LINEAR TIME TRENDS											
Urban	-0.009	-0.011	-0.016*	-0.022**	-0.030***	0.134***	0.122***	0.126***	0.056**	0.084**	0.096***
	[0.008]	[0.009]	[0.009]	[0.011]	[0.011]	[0.021]	[0.023]	[0.021]	[0.024]	[0.036]	[0.036]
Rural	0.003	-0.005	-0.009	-0.019	-0.019	0.303***	0.297***	0.290***	0.061	0.098**	0.071
	[0.016]	[0.013]	[0.014]	[0.018]	[0.018]	[0.032]	[0.028]	[0.030]	[0.049]	[0.044]	[0.054]
Urban-Rural	-0.012	-0.006	-0.007	-0.003	-0.011	-0.169***	-0.175***	-0.163***	-0.005	-0.014	0.025
	[0.015]	[0.013]	[0.013]	[0.019]	[0.019]	[0.038]	[0.035]	[0.036]	[0.052]	[0.062]	[0.073]
A2) QUADRATIC TIME TRENDS											
Urban	-0.009	-0.006	-0.007	0.004	-0.002	0.202***	0.206***	0.200***	0.095*	0.150**	0.155***
	[0.015]	[0.019]	[0.019]	[0.019]	[0.021]	[0.046]	[0.043]	[0.044]	[0.056]	[0.063]	[0.059]
Rural	0.027	0.034	0.045	0.056	0.072	0.443***	0.413***	0.389***	0.183***	0.212***	0.172***
	[0.038]	[0.037]	[0.038]	[0.049]	[0.049]	[0.022]	[0.029]	[0.028]	[0.024]	[0.026]	[0.027]
Urban-Rural	-0.036	-0.040	-0.051	-0.053	-0.073	-0.240***	-0.207***	-0.189***	-0.088*	-0.062	-0.017
	[0.036]	[0.035]	[0.033]	[0.055]	[0.058]	[0.050]	[0.045]	[0.044]	[0.053]	[0.066]	[0.063]
N	14,834	14,742	14,622	14,435	13,875	12,859	11,944	11,028	10,104	9,160	8,758

B) 5-YEAR INTERVALS ON BOTH SIDES (1980-1984 and 1987-1991 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	-0.004	0.000	-0.002	0.007	0.005	0.175***	0.164***	0.162***	0.022	0.053*	0.067**
	[0.014]	[0.019]	[0.016]	[0.015]	[0.016]	[0.041]	[0.039]	[0.039]	[0.018]	[0.031]	[0.032]
Rural	0.001	0.004	0.011	0.012	0.022	0.375***	0.357***	0.354***	0.135***	0.181***	0.154***
	[0.023]	[0.022]	[0.024]	[0.033]	[0.031]	[0.018]	[0.020]	[0.019]	[0.036]	[0.038]	[0.050]
Urban-Rural	-0.005	-0.003	-0.013	-0.005	-0.017	-0.200***	-0.193***	-0.192***	-0.113***	-0.129**	-0.087
	[0.021]	[0.022]	[0.021]	[0.036]	[0.036]	[0.045]	[0.035]	[0.035]	[0.033]	[0.054]	[0.066]
N	8,730	8,679	8,607	8,514	8,401	7,873	7,366	6,860	6,346	5,787	5,390

C) 3-YEAR INTERVALS ON BOTH SIDES (1982-1984 and 1987-1989 Birth Cohorts) LINEAR TIME TRENDS											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	0.010	0.007	0.008	0.035	0.036*	0.126***	0.125***	0.117***	0.044***	0.089***	0.101***
	[0.022]	[0.020]	[0.026]	[0.022]	[0.020]	[0.024]	[0.021]	[0.022]	[0.010]	[0.028]	[0.029]
Rural	-0.028	-0.022	-0.008	-0.007	-0.001	0.450***	0.435***	0.414***	0.171***	0.216***	0.193***
	[0.019]	[0.022]	[0.029]	[0.041]	[0.039]	[0.026]	[0.026]	[0.027]	[0.014]	[0.025]	[0.035]
Urban-Rural	0.037***	0.029***	0.016***	0.042**	0.036*	-0.324***	-0.310***	-0.297***	-0.128***	-0.127**	-0.092
	[0.007]	[0.003]	[0.003]	[0.021]	[0.020]	[0.050]	[0.046]	[0.047]	[0.023]	[0.051]	[0.061]
N	5,158	5,129	5,088	5,036	4,998	4,943	4,894	4,398	3,901	3,394	3,363

D) 2-YEAR INTERVALS ON BOTH SIDES (1983-1984 and 1987-1988 Birth Cohorts) NO TIME TREND											
Grade Level	1	2	3	4	5	6	7	8	9	10	11
Urban	0.004	0.004	0.002	-0.002	-0.007**	0.184***	0.181***	0.179***	0.090***	0.113***	0.118***
	[0.005]	[0.006]	[0.007]	[0.005]	[0.003]	[0.003]	[0.006]	[0.007]	[0.005]	[0.018]	[0.019]
Rural	0.018	0.017	0.022*	0.016	0.014	0.438***	0.430***	0.419***	0.154***	0.203***	0.187***
	[0.014]	[0.012]	[0.012]	[0.015]	[0.013]	[0.033]	[0.031]	[0.030]	[0.046]	[0.041]	[0.060]
Urban-Rural	-0.014	-0.014**	-0.019***	-0.018	-0.021	-0.255***	-0.249***	-0.240***	-0.065	-0.089	-0.069
	[0.009]	[0.006]	[0.005]	[0.016]	[0.014]	[0.031]	[0.026]	[0.024]	[0.042]	[0.060]	[0.079]
N	3,479	3,457	3,434	3,394	3,370	3,336	3,313	3,277	2,794	2,303	2,279

Notes: The predicted values are based on the estimates in Table 8. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 10 Effect of the Policy on Completed Years of Schooling at Age 15 and Age 17 by Gender and Rural/Urban Residence

	Age 15			Age 17	
Birth Cohorts:	1978-1984, 1987-1993		1983-1984, 1987-1988	1980-1984, 1987-1991	1983-1984, 1987-1988
Time Trend (Splines):	Linear	Quadratic	None	Linear	None
	A) Gender Differences in Urban Areas				
Policy	0.349**	0.511	0.535**	0.803**	0.910**
	[0.150]	[0.344]	[0.130]	[0.272]	[0.177]
Policy * Female	0.067	-0.058	-0.019	-0.072	-0.075
	[0.147]	[0.455]	[0.114]	[0.343]	[0.207]
Composite Female	0.417***	0.454	0.517***	0.731**	0.835***
	[0.081]	[0.450]	[0.016]	[0.236]	[0.087]
N	8,755	8,755	2,947	5,734	2,292
R-squared	0.145	0.145	0.140	0.145	0.144
	B) Gender Differences in Rural Areas				
Policy	0.797***	1.051**	0.993***	1.391***	1.327***
	[0.092]	[0.350]	[0.046]	[0.239]	[0.071]
Policy * Female	0.329	-0.042	0.272	0.080	0.294
	[0.210]	[0.458]	[0.122]	[0.243]	[0.162]
Composite Female	1.125***	1.009***	1.265***	1.471***	1.621***
	[0.152]	[0.295]	[0.120]	[0.178]	[0.168]
N	5,518	5,518	1,818	3,565	1,426
R-squared	0.332	0.333	0.335	0.333	0.327
	C) Rural/Urban Differences for Men				
Policy	0.331**	0.480	0.512**	0.786***	0.885***
	[0.127]	[0.295]	[0.110]	[0.238]	[0.149]
Policy * Rural	0.463**	0.459	0.466**	0.526*	0.433***
	[0.173]	[0.457]	[0.120]	[0.242]	[0.068]
Composite Rural	0.795***	0.939**	0.979***	1.312***	1.318***
	[0.081]	[0.313]	[0.077]	[0.240]	[0.086]
N	5,185	5,185	1,488	3,512	1,415
R-squared	0.167	0.167	0.137	0.180	0.170
	D) Rural/Urban Differences for Women				
Policy	0.425***	0.494	0.523***	0.719***	0.820***
	[0.076]	[0.417]	[0.015]	[0.216]	[0.072]
Policy * Rural	0.713***	0.552	0.756***	0.757**	0.811*
	[0.148]	[0.478]	[0.099]	[0.271]	[0.261]
Composite Rural	1.137***	1.046***	1.279***	1.476***	1.631***
	[0.141]	[0.271]	[0.114]	[0.156]	[0.194]
N	9,088	9,088	3,277	5,787	2,303
R-squared	0.307	0.307	0.307	0.313	0.318

Notes: A separate OLS regression is run in each column within a panel, where the dependent variable is the completed years of schooling at that age. "Composite female" coefficient is the sum of the "policy" and "policy*female" coefficients, and "composite rural" coefficient is the sum of "policy" and "policy*rural" coefficients. Time trends are allowed to be different before and after the policy and by gender. Control variables also include dummies for 5 geographical regions, large city/small city. Standard errors are clustered at the level of year of birth. Statistical significance is *** at 1 percent level, ** at 5 percent level, * at 10 percent level.

APPENDIX

Table A1 Ministry of Education's Share in Public Investment Budget

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Percent Share	15.2	14.7	37.3	29.0	28.4	22.3	22.3	16.4	16.9	12.1

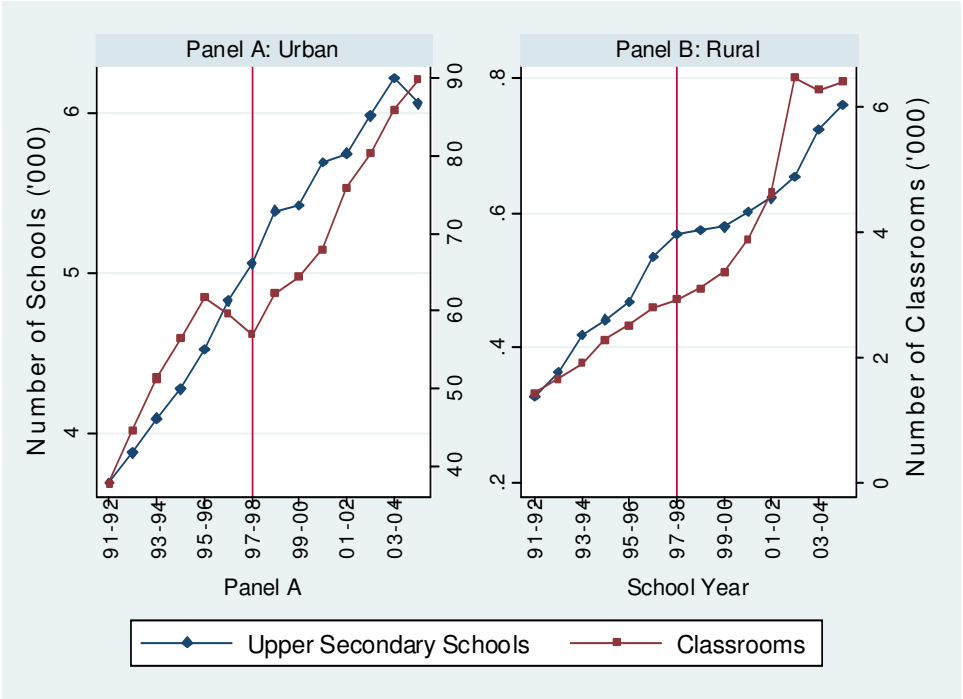
Source : Turkish Statistical Institute (2006)

Table A2 Wage Rate by Educational Attainment for Men

	Less Than Primary	Primary School	Secondary School	High School	2-Year College	College	Above College
Log Mean Hourly Wage Rate	0.51	0.73	0.85	1.15	1.38	1.63	2.05
Number of Observations	190	2950	1096	2170	268	732	57

Notes: The data come from 2003 Turkish Income and Expenditure Survey. The year 2003 is chosen because the sample size is larger than those in other years. The sample is restricted to males aged 25 to 44 living in urban areas and working as wage earners. Observations where the annual hours of work is less than 100 or annual earnings are less than 100 Liras are dropped.

Figure A1 Number of Schools and Classrooms in Upper Secondary Education (Grades 9-11) by Urban and Rural Residence



Source: Turkish Statistical Institute (1993-2006).